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## PEOPLE'S REPUBLIC OF CHINA SCIENTIFIC ABSTRACTS

No. 175

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ACTA PALAEOLOGICA SINICA

AUTHOR: LIU Chin-ling [0491 6855 7117]  
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ORG: Both of Nanking Institute of Geology and Paleontology, Chinese Academy of Science

TITLE: "Studies on the Quaternary Sporo-Pollen Assemblage from Shanghai and Chekiang With Reference to its Stratigraphic and Palaeoclimatic Significance"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 1-11

TEXT OF ENGLISH ABSTRACT: This paper aims at preliminarily summing up the materials of Quaternary sporo-pollen obtained from Shanghai and some districts in Zhejiang province. Based on the characteristics of this sporo-pollen assemblage, eight zones may be divided in ascending order as follows: Qinglinggang zone, zones I, II, III, IV, V, VI and VII (as shown on the sporo-pollen diagram I). Among them, zone IV may be equivalent to Tianmushan zone. From the paleoclimatic viewpoints, Qinglinggang zone, zone II, zone IV or Tianmushan zone and zone VI are believed to give expression to the cold climate, while the rest to the mild climate. Accordingly, the present writers have made a comparison of the above-mentioned zones with the Quaternary glacial age and, moreover, have

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 1-11]

carried out a comparatively comprehensive study of the Quaternary stratigraphic classification in that area. Finally, in this paper there is also a brief discussion about the transportation of sporo-pollens.

AUTHOR: LI Hsing-hsueh [2621 2502 1331]  
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ORG: Both of the Nanking Institute of Geology and Palaeontology, Chinese Academy of Science

TITLE: "Early Devonian Zosterophyllum-Remains from Southwest China"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese, Vol 16, No 1, Mar 77 pp 12-36

TEXT OF ENGLISH ABSTRACT: The zosterophylloid remains described in the present paper were found from the Cuifengshan Group of eastern Yunnan and its equivalents of adjacent provinces. The material contains 29 species, of which 19 are, however, only mentioned without being named. Of the 10 more or less definitely determined species, 7 are treated as new, i.e., *Zosterophyllum longhuashanense*, *Z. spathulatum*, *Z. bifurcatum*, *Z. contiguum*, *Z. subverticillatum*, *Z. dushanense* and *Z. sinense*. The present study adds much to our knowledge of *Zosterophyllum* as well as the early Devonian plants of China.

The presence of *Z. myretonianum* and *Z. australianum* in Southwest China is worthy of attention. Since *Z. myretonianum* occurs in Gedinnian strata of

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 12-36]

Scotland, in Coblencian deposits of Siberia, and the *Z. australianum*-bearing formations in Australia are generally considered to be the Siegenian or persisting throughout the Siegenian to the early and Middle Emsian in age. From all available evidence, the age of the Cuifengshan Group might be nearly contemporaneous with the Gedinnina, ranging throughout Siegenian to the Emsian of the W. European chronology.

For further information pertinent to the stratigraphic positions and the animal associates of early Devonian plants in the Cuifengshan Group or in its subdivisions, the reader is referred to the generalized section (Table 1) shown on the Chinese text p 13.

AUTHOR: LIAO Wei-hua [1675 5898 5478]

ORG: Nanking Institute of Geology and Palaeontology, Chinese Academy of Science

TITLE: "On the Middle and Upper Devonian Boundary by Tetracorals in Tu-shan District, Southern Kweichow"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 37-52

TEXT OF ENGLISH ABSTRACT: For a longer time, the boundary between the Middle and the Upper Devonian was drawn by the disappearance of brachiopods *Stringocephalus* and the first appearance of *Cyrtospirifer*. However, in Southern Guizhou (Kueichow) after the disappearance of *Stringocephalus* and before the appearance of *Cyrtospirifer*, there exists a considerable thickness of deposits lying on the top of the Jiwozhai member of the Middle Devonian. Dushan (Tushan) formation. In the deposits have been obtained a number of rugose corals, namely: *Temnophyllum leei* Wang et Lee, T. sp., *Grypophyllum mackenziense* (Pedder), *Sinodisphyllum litvinovishae* (Soshkina), *Pseudozaphrentis wangchengpoensis* Yu et Liao, *P. dushanensis* (sp. nov.), *Mictrophyllum modicum* Smith, *M. intermedium* (sp. nov.), *M. brevisseptatum* (sp. nov.), *M. sinense* (sp. nov.), *Hexagonaria thomasi* (Stainbrook).

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 37-52]

The so-called solitary corals *Sinodisphyllum*, *Pseudozaphrentis* and *Mictrophyllum* are the characteristic forms of early Upper Devonian, whereas *Grypophyllum mackenziense*, represented as a typical species, is recorded from the earliest Upper Devonian in Western Canada and *Hexagonaria thomasi* from the Upper Devonian in Iowa of U.S.A. and in the Urals and Russian Platform of U.S.S.R. The present writer, therefore, tends to believe that the above-mentioned corals-bearing beds belong to the Upper Devonian.

AUTHOR: FENG Ju-lin [7458 0320 2651]

ORG: Geological Party of Kweichow

TITLE: "Discovery of Syringothyris from Southern Kweichow and its Significance"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 53-58

TEXT OF ENGLISH ABSTRACT: The Syringothyris mentioned herein was found and collected by members of the Geological Party of Guizhou in 1964 and 1974 respectively while they were making their geological survey.

Seven species are identified in which two species are considered as new. They are listed as follows: Syringothyris texta (Hall), S. cf. texta (Hall), S. hannibalensis (Swallow), S. missouri Hall, S. rhomboidalis (sp. nov.), S. dushanensis (sp. nov.), S. cf. typha Winchell.

So far as known, Syringothyris has widely spread all over the Northern Hemisphere and is regarded as one of the characteristic fossils of the Lower Carboniferous in Northwest China and Southern Xizang. However, it is made known for the first time in South China.

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 53-58]

From the discovery of Syringothyris in Southern Guizhou, we are led to believe that: 1) the Syringothyris-bearing sea in the early Carboniferous (known as Tournaisian stage) might have once reached to this region; 2) it has provided new information on the stratigraphic correlation of Lower Carboniferous between Southern Guizhou on the one hand, and Northwest China and Southern Xizang on the other; 3) the new finding Syringothyris together with its associated fossils is quite similar to those brachiopods found in the Mississippi System, a fact which indicates the vast extent to its geographical distribution as well as the firmness on their stratigraphic position.

AUTHOR: HSU Han-k'uei [6079 3352 1145]

ORG: Nanking Institute of Geology and Palaeontology, Chinese Academy of Science

TITLE: "Early Middle Devonian Plicanoplids from Nan-tan of Kwangsi"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 59-72

TEXT OF ENGLISH ABSTRACT: The early Middle Devonian Tangxiang formation (or called as the Nabiao formation) exposed in Luofu of Nandan, Guangxi, is composed of black-gray, light gray, carbonaceous and siliceous mudstones, attaining a thickness of about 360 m. The mudstones contain plentiful tentaculites, cephalopods, trilobites, as well as many smaller brachiopods. So far as the brachiopods are concerned, they are fairly rich in kind but are quite different in assemblage and features from those in the contemporaneous deposits of Southwest China. The whole brachiopods and their stratigraphical significance will be discussed in other article.

In the present paper, special reference is made to plicanoplids, which, so far as is known, have been unrecorded in this country, or at least little recorded

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 59-72]

abroad. As it bears its peculiar internal and external structures, its systematic position is still in dispute, some paleontologists referred it to Strophomenacea or Chonetacea, others to Atrypacea. However, the specimens under study show such characteristics as follows: shell small with a thin visceral cavity, without punctate shell; internal part of ventral shell having pedical tube but lacking in foramen, ventral muscular scars indistinct. Cardinal process of dorsal valve recurved and rectangular in outline with the long axis transverse. Socket ridge nearly parallel to hinge line. Spiralia scar unseen. Accordingly, it seems feasible that Plicanoplids may be erected as a new superfamily Plicanoliacea.

In this paper are described a new family Plicanoplidae, 5 new genera, 6 new species and an indeterminate species, namely, *Costanoplia faceta*, *C. sp.*, *Paracostanoplia mirabilis*, *Luofaia delicata*, *Paraplicanoplia nana*, *P. multicostata*, *Tangxiangia delicata*, all belonging to Plicanoliacea.

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ORG: Both of Nanking Institute of Geology and Palaeontology, Chinese Academy of Science

TITLE: "On the Pleurodium and its Relative Genera"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 73-80

TEXT OF ENGLISH ABSTRACT: The internal structure of Pleurodium Wang, 1955 (Brachiopoda) found from the upper part of Lojoping Formation, Dazhongba, Yichang district, western Hubei is here dealt with in detail. Its ventral valve is characterized by spondylium curved strongly far into the dorsal valve and very short median septum. Both outer and inner brachial plates of the dorsal valve rather finely thin and short, only 1-2 mm in length; brachial processes thin tabulated, projecting laterally and crossing in an obtuse angle with the inner brachial plates. The valves, as a whole are composed mainly of fibrous layer, but devoid of prismatic layer. It may be concluded that in comparison with other relevant families, subfamilies and genera, and taking into account its inner structure and outer morphological

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 73-80]

feature, the present writers tend to assign Pleurodium to Family Virgianidae, with Pleuodiinae, as new subfamily. To the best knowledge of the present writers, Pleurodium is distributed restrictively in Southwest China and is believed to be the early Late Llandoveryan in age. It is worth mentioning that Pleurodium, known to occur in association with Stricklandia and Pentamerus, is therefore of important significance in establishing ecological community position.

AUTHOR: CH'EN P'i-chi [7115 0012 1015]  
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ORG: Nanking Institute of Geology and Paleontology, Chinese Academy of Science

TITLE: "On the Discovery of Afrograptidae (Conchostraca) in Chekiang With Its Significance"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 81-84

TEXT OF ENGLISH ABSTRACT: During the Jurassic-Cretaceous age, Afrograptids are generally known to be chiefly distributed in the Gondwana land but unseen in the continental beds of the northern land. Recently Afrograptids have been found one after another from the Cretaceous sediments in NW China, NE China and SE China, thus indicating a fact that they immigrated along the northern shore of the Tethys Sea to the eastern part of Asia, where they mixed with the indigenous forms and consequently produced some new ones. Here are described 2 new genera *Migransia* and *Zhestheria* of Afrograptidae which are found from Zhejiang. Including the 6 known genera *Afrograpta*, *Camerunograpta*, *Congestheriella*, *Nigerestheria*, *Australestheria* and *Porostracus*, Afrograptidae now amounts to 8 genera. In this paper,

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 81-84]

their immigration and evolution are briefly discussed. Besides, their distribution in the volcanic-sedimentary rocks of that region and other related conchostracan fossils are also introduced.

AUTHOR: WU Hung-chi [0124 7703 1015]

ORG: Nanking Institute of Geology and Paleontology, Chinese Academy of Science

TITLE: "Comments on New Genera and Species of Silurian-Devonian Trilobites in Southwest China and Their Significance"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 95-119

TEXT OF ENGLISH ABSTRACT: The trilobites dealt with in this paper are found in three horizons, namely, 1) the Shangshuyuan-Leijiadun formation of Lower Silurian, being mostly characterized by the presence of *Leioscutellum* (gen. nov.) *Shiqiania*, *Gaotania*, *Hypaproetus* (gen. nov.) and *Oidalaproetus* (gen. nov.) etc., with *Ptilillaenus* as its leading form; 2) the Xiushan formation of Middle Silurian, being all characterized by the presence of some new species of *Kosovopeltis*, taking *Chuanqianoproetus* (gen. nov.) as its leading form; and 3) the Guandi formation, bearing chiefly *Acanthopyge orientalis* (sp. nov.), with only a few fossil trilobites. Taking also account the presence of such associated fossils as brachiopods, conodonts and the absence of *Coronocephalus*, known commonly as an important element in the

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 95-119]

Middle Silurian of the Xiushan formation, it is thus suggested that the Guandi formation may be preferably referable to the Upper Silurian. Moreover, considering that *Warburgella rugulosa*, together with its subspecies, is known to occur in the Gedinnian stage of the Upper Devonian series in a world-wide scale, the present writer is of the opinion that due to the occurrence of *W. rugulosa sinensis* (subsp. nov.) in the lower part of the Yulongshi formation, it is reasonable to draw a Silurian-Devonian boundary, with *W. rugulosa sinensis*-bearing black mudstone in the lower part of the Yulongshi formation as the lower limit of the Devonian in Southwest China.

In this paper are described 14 genera, 21 species and one new subspecies among which 4 genera (*Leioscutellum*, *Chuanqianoproetus*, *Hypaproetus*, and *Oidalaproetus*) and 18 species are recognized as new.

AUTHOR: LIU I-jen [0491 5030 0088]

ORG: Regional Surveying Team, Geological Bureau of Hunan Province

TITLE: "A Study of Two Genera of the Late Cambrian Olenidae (Trilobita) from T'ao-yuan, Hunan"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 120-127

TEXT OF ENGLISH ABSTRACT: The Family Olenidae is commonly known as the typical element of the Atlantic Type of the Western Fauna. Two new genera of Olenidae, i.e., Humanolenus and Huangshiaspis are described in this paper. It seems that provided the depositional environment remains same, the Southeastern Type of the Eastern Fauna and the Atlantic Type of the Western Fauna had, with their own corresponding and similar characteristics, developed ahead in a parallel way. In this paper is taxonomically recognized one new subfamily Humanoleninae, which belongs to Family Olenidae and in which the two new genera Humanolenus and Huangshiaspis, together with Hedinaspis, may be included.

AUTHOR: CH'IU Chan-hsiang [6726 0594 4382]

ORG: Institute of Vertebrate Palaeontology and Palaeoanthropology, Chinese Academy of Sciences

TITLE: "New Genera of Pseudictopidae (Anagalida, Mammalia) From Middle-Upper Palaeocene of Ch'ien-shan, Anhwei"

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 128-148

TEXT OF ENGLISH ABSTRACT: It is well known that the peculiar and endemic Asiatic mammalian family, Pseudictopidae, was represented by a single genus since its first discovery in 1925. Recent discoveries in Anhui from 1970 to 1973 have greatly changed the picture. At least 3 new genera of Pseudictopidae have been recognized among the middle-late palaeocene mammals of Qianshan.

Anictops tabiepedis, gen. et sp. nov., the most primitive of the known members of this family. Lower jaw slender, with straight lower border, symphysis stretches only to P<sub>2</sub>, lower C serrated, P<sup>3</sup>-P<sup>4</sup> metacones scarcely differentiated, cheek teeth not so hypsodont and widened as in Pseudictops, trigonids and

[continuation of KU-SHENG-WU HSUEH-PAO Vol 16, No 1, Mar 77 pp 128-148]

talonids almost equally broad, length of limb bones only about 3/4 of that of Pseudictops. Middle palaeocene.

Paranictops majuscula, gen. et sp. nov., a phyletically intermediate form between Anictops and Pseudictops. C non-serrated, lower jaw stouter, P<sup>3</sup>-P<sup>4</sup> talonids shorter. Middle palaeocene.

Allictops inserrata, gen. et sp. nov., approximating Pseudictops in size and molar hypsodonty, but C non-serrated, P<sup>2</sup> comparatively small, cheek teeth with larger parastyles. Late palaeocene.

The second part of this article is devoted to detailed analysis of these new genera in connection with such related groups, as Leptictidae, Pantolestidae, Zalambdolestidae, Anagalidae, Eurymylidae, etc.

Some aspects of functional morphology are also briefly discussed.

AUTHOR: LING Ku [7227 6253]

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TITLE: "On-the-Spot Meeting Concerning the South China Red Beds Held at Nan-hung, Kwangtung

SOURCE: Peking KU-SHENG-WU HSUEH-PAO [ACTA PALAEONTOLOGICA SINICA] in Chinese Vol 16, No 1, Mar 77 pp 149

ABSTRACT: The Chinese Academy of Sciences Conference on South China red beds was held between November 24 and December 6 of 1976 at Nan-hung County of Kwangtung. Participating at the conference were more than 180 representatives from 90 production, scientific, research, and educational units of 24 provinces, municipalities, and autonomous regions.

The most recent results from research on South China red beds and biota were discussed at the conference. Sixty papers on biostratigraphic, micropaleontologic, palaeobotanical invertebrate and vertebrate palaeontological research were also presented at the conference.

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ACTA GEOPHYSICA SINICA

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TITLE: "A Study of Certain Features of a Foreshock Sequence and That of an Ordinary Earthquake Swarm"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20, No 2, Apr 77 pp 89-95

TEXT OF ENGLISH ABSTRACT: To study certain features of the seismic activity of a foreshock sequence and their difference from that of an ordinary earthquake swarm will be of value to the study of the process of development of the main shock at its focus and to earthquake prediction. It is for this purpose that the detailed data, of 17 of the larger earthquakes that occurred within the last ten years or so in China, have been processed and analyzed. The results show that the activity of the foreshocks begins at a comparatively early date before the main shock that there seems to be some

[continuation of TI-CH'IU WU-LI HSUEH-PAO Vol 20, No 2, Apr 77 pp 89-95]

correlation between the foreshock activity and changes in the wave velocity ratio. If appropriate time intervals are chosen before the main shock, the number of foreshocks in an interval generally increases with time exponentially. Furthermore, a foreshock with magnitude over 4 of a large earthquake differs in the rate of strain release from that of an earthquake of the same magnitude of an ordinary earthquake swarm.

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TITLE: "Present Tectonic Stress Field and its Relation to the Characteristics of Recent Tectonic Activity in Southwestern China"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 96-109

TEXT OF ENGLISH ABSTRACT:

Based on the analysis of the focal mechanism solutions of 51 earthquakes occurring in Southwestern China and geological data of 10 earthquake fault zones of the region, we discuss in this paper, division of the present tectonic stress field in Southwestern China into separate regions and their relation to the recent tectonic activity.

It has been found that a tectonic block in the shape of an inclosed rhomb bounded by the Xianshuihe (鲜水河), Anninghe (安宁河), Xiaojiang (小江), Qujiang (曲江)

(continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 96-109)

and Red River on the east, south and southwest, is moving southeastward relative to the surroundings. This rhombic block controls the occurrence of most of the earthquakes in this area.

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TITLE: "The Yongshan(永善)—Daguan(大关) Earthquake ( $M=7.1$ ) on May 11, 1974"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 110-114

TEXT OF ENGLISH ABSTRACT:

In this paper, the seismo-tectonic structure associated with the occurrence of the Yongshan (永善)—Daquan (大关) Earthquake,  $M = 7.1$ , on May 11, 1974 in Yunnan Province is discussed. It has been pointed out that the main shock was caused by at least two separate fractures on a fault striking  $N34^{\circ}W$  and dipping to the northeast. The direction of fracturing was from southeast toward the northwest. However, the fault associated with the strongest aftershock of June 15 has a strike of  $N40^{\circ}E$  and dip to the southeast. Just before the occurrence of this aftershock, the rate of strain release greatly increased and at the same time epicenters lined up along a definite direction.

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TITLE: "Preliminary Study of the Velocity Anomalies of Seismic Waves Before and After Some Strong and Moderate Earthquakes in Western China (II) —The Anomalous Regions and their Characteristics"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 115-124

TEXT OF ENGLISH ABSTRACT:

In this paper the methods for the determination of the seismic velocity anomalous regions before earthquakes, based on the arrival times of the direct waves are given. Some preliminary results regarding the anomalous regions before some strong and moderate earthquakes in Western China have been obtained. Certain fundamental characteristics of the anomalous regions have been investigated and discussed, namely, the form, the size and orientation of each of the anomalous regions, the rela-

(continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 115-124)

tive positions of the main shocks within the regions and the distribution and development of the velocity anomalies. Finally, the relationship between the anomaly size and the linear dimension of the earthquake sources is derived and discussed briefly.

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TITLE: "Spectral Changes of Fore- and After-Shocks of the Haicheng (海城) Earthquake"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 125-130

TEXT OF ENGLISH ABSTRACT:

Spectral changes of waves from small earthquakes before and after the Haicheng earthquake have been investigated. Here we introduce the notion of "Modified Average Dislocation":  $F' = M_L - \log S$ . The results indicate that for foreshocks the values of  $F'$  are about 3.0 while for aftershocks  $F'$  are about 2.5. Besides, by using the formula  $\log M_0 = 1.7M_L + 15.1$  and  $\Delta\sigma = \frac{CM_0}{S^{3/2}}$ , we determined the seismic moment

(Continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 125-130

and the stress drop, respectively. The result gives stress drop for foreshocks values of a few bars and for aftershocks values below 1 bar.

Received 25 June 1976

AUTHOR: HO Chih-t'ung [0149 1807 2717]  
HSIEH T'ing [6200 2185]

ORG: Both of the Institute of Geophysics, Chinese Academy of Science

TITLE: "The Hypocentral Distribution of the Xingtai (邢台) Earthquake Series, Tectonic Stress Field and the Process of Earthquake Occurrences"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 131-142.

TEXT OF ENGLISH ABSTRACT:

In March 1966, five successive strong earthquakes of magnitude  $M_s \geq 6$  occurred in the xingtai region of the Hopei Province, China. Among them, the earthquake occurred on March 22 near Dongwang (东汪) of the Ningjin xian (宁晋县) has the largest magnitude ( $M_s = 7.3$ ). In this paper, the hypocentral space distribution of these strong earthquakes and their relatively large aftershocks is discussed. Then, using known focal parameters of some of these earthquakes, an analysis of the form of recent tectonic movement of the region and the general stress pattern before the earthquake series has been made. Finally, it is attempted to explain the process of

(continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 131-142)

migration and the mutual triggering effect of the earthquakes in the light of the above analysis.

Received July 1976

AUTHOR: LIU Yuan-lung [1491 1337 7893]  
WANG Chien-shen [3769 6197 6500]  
WU Ch'uan-chen [2976 0278 3791]  
CHOU Wen-hu [0719 2429 5706]

ORG: All of the Institute of Geophysics, Chinese Academy of Science

TITLE: "A Preliminary Study of the Crustal Structure and the Geological Significance of the Central Portion of the Himalayan Mountain Range"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 143-149

TEXT OF ENGLISH ABSTRACT:

In this work, the method of "Compressed Mass Plane" is used to draw from gravity data the depth contours of the Mohorovicic Discontinuity, the Conrad Discontinuity and the lower surface of the granite layer I beneath the central portion of the Himalayan Mountain Range. It can be seen from such contours that within the Himalaya region, the depth of the abovementioned crustal discontinuities varies rather abruptly. The Himalayan mountain range is situated on the sloping part of these crustal discontinuities. The crust in this region appears to have no "mountain root" and it has not reached the stage of isostatic equilibrium. However, in southern Tibet, north of the line running from Chu Zhong, Cha Dang to Ge Long Gong Ba (楚

(continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 143-149)

中,查当至莫隆公巴), the crust seems to be in isostatic equilibrium. The gradual up-lifting at present of the Himalayan mountain region possibly involves the existence of forces relating to plate tectonic movements which may be considered as much stronger than that of the isostatic adjustments. Besides, earthquake source mechanism analysis giving a south-north direction for the axis of compression, and also in view of the thrusting character of a series of major faults observed in this region, it may be inferred that the Indian Plate moving northward pushes and collides with the Asian Plate. Again, all such facts as the epicentral distribution of shallow earthquakes of the Himalaya region forming belts, the structural peculiarity of the crustal layers, abrupt change of the depth of the Mohorovicic Discontinuity and finally the state of incomplete isostatic equilibrium constituent the tectonic background for the frequent occurrence of strong earthquakes in this region.

Received 20 August 1976

AUTHOR: WANG Ch'ing-i [3759 1987 0044]

ORG: None

TITLE: "On the Saturation Effect of the Induced Polarization Method"

SOURCE: Peking TI-CH'IU WU-LI HSUEH PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 150-156

TEXT OF ENGLISH ABSTRACT:

From theoretical calculations, H. O. Seigels<sup>(1)</sup> has shown that a spherical polarized body with the content of conductive particles up to as much as 25% will give the maximum IP anomalies. Hence, it is considered that the IP method is only suitable for exploration of disseminated ore bodies of medium ore content and not for ore bodies of high ore content or of the highly conductive massive type. Moreover, as reported, this saturation effect has also been confirmed in field observations.

However, according to our field experience in China, rather fine IP anomalies can be obtained on highly conductive and massive ore bodies in most cases. In this paper, we try to show that saturation effect of induced polarization does not exist. It is believed that the IP method is equally applicable to the exploration of highly conductive and massive ore bodies. The theoretical conclusion of Seigel probably comes from

(continuation of TI-CH'IU WU-LI HSUEH PAO, Vol 20 No 2, Apr 77, pp 150-156)

the extension of the formulas for ore bodies with low ore content to those with high ore content without taking into consideration of the change of conditions. Finally, the influence of electrical resistivity on the apparent intensity of polarization of disseminated spherical ore bodies is discussed.

- [1] H. O. Seigel, A theory of induced polarization effects (for Stepfunction Excitation). International Series of Monographs on Earth Sciences, (Overvoltage Research and Geophysical Applications), 4, 4—21.

Received 24 October 1975

AUTHOR: WANG Chi-lun [3769 4949 0243]

ORG: The Metallurgical Geophysical Prospecting Company

TITLE: "Designing Principles of a Two-Dimensional Optimum Linear Digital Filter"

SOURCE: Peking TI-CH'IU WU-LI HSUEH-PAO [ACTA GEOPHYSICA SINICA] in Chinese, Vol 20 No 2, Apr 77, pp 157-168

TEXT OF ENGLISH ABSTRACT:

In order to discern slowly varying weak anomalies on a background of noise field and to deal with problem like limiting the instability of the solution due to high-frequency magnification of errors in the series of calculations such as the downward-continuation of potential field, this paper discusses the designing principles of an optimum linear digital filter in the least square sense. This may be transformed into the mathematical problem, namely how to select the optimum filtering function in the space of the  $L_2$  linear normed function. It would be very complicated and difficult, if the problem is to be solved directly in the space domain. We found that it may be mathematically much simpler and more rigorous, if we should directly select the transfer function or the wave-number response of the optimum linear filter in the wave-number domain by using the method of isoperimetric problem in calculus of variations. In this way, the expression of the transfer function of the selected optimum linear filter is quite simple, namely,  $L(f, k) = |S_i(f, k)|^2 / \{ |S_i(f, k)|^2 + \lambda |N_i(f, k)|^2 \}$

(continuation of TI-CH'IU WU-LI HSUEH-PAO, Vol 20 No 2, Apr 77, pp 157-168)

where  $|S_i(f,k)|^2$  and  $|N_i(f,k)|^2$  express the energy spectra (or the power spectra) of the filter input signal and noise respectively;  $f, k$  are wave numbers on the  $x$  and  $y$  directions.

In regard to the above-mentioned two types of the problem and the two related optimum linear filters, the expressions of  $L(f,k)$  are the same. They differ only in the conditions of selecting the parameter ( $\lambda$ ).

After setting up the theoretical expression of the transfer function  $L(f,k)$  of the optimum linear filter, we should be able in the least square sense to examine various linear filtering methods, so far published in foreign and domestic literatures in solving the above-mentioned two types of the problems and to show that the optimum results of the linear filtering can be achieved theoretically for different signal and noise conditions. Thus, it provides theoretical criterion for designing two-dimensional linear digital filters.

For the observed results of the harmonic functions of potential fields, the above theory can be applied easily to the designing of optimum linear digital filters, but only in the approximate manner.

Received 14 November 1975

9129

CSO: 4009

ACTA PHYSICA SINICA

AUTHOR: TANG Ying-wu [0781 2019 0710]

ORG: None

TITLE: "The Normal-Mode Sound Field in Shallow Water Having a Positive Sound Velocity Gradient and a Random Fluctuation Surface"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 481-486

ABSTRACT: The influence of the surface and the bottom of shallow water on the normal-mode sound field in the shallow water is found to be a function of the reflection coefficient of the plane wave passing over the surfaces. Approximate expressions for the pole equations and the amplitude functions are obtained for the three cases: Subcritical, Critical and Supercritical. At high frequencies, the influence of the surface on the subcritical normal-mode wave is relatively large, while the effect of the bottom is negligible. Both the surface and the bottom have equally significant influence on the critical normal-mode wave. The influence of the bottom on the supercritical normal-mode wave is relatively large, while the effect of the surface is negligible.

Received 15 September 1975

AUTHOR: FANG Li-chih [2455 0536 0037]  
LIU Yung-chen [0491 3057 6966]

ORG: Both of The Chinese University of Science and Technology

TITLE: "Raman Scattering of Relativistic Electrons in a Strong Magnetic Field"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 521-526

ABSTRACT: Raman scattering of relativistic electrons in a strong magnetic field is described by the method of quantum mechanics. Actual conditions such as those that may exist on a celestial body are substituted into the equations describing the conservation of energy and the conservation of momentum and an approximate differential cross-section of the Raman process is obtained for those conditions of some practical significance.

Received 18 January 1975

AUTHOR: CH<sup>o</sup>I Kuo-ying [7871 0948 5391]  
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ORG: Both of Industrial-Agricultural Soldier Student, Class of 1972, Chinese University of Science and Technology

TITLE: "Seismic Spectra and Variations in the Seismic Spectra of Medium-Scale Earthquakes Before and After Strong Earthquakes"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 527-532

ABSTRACT: The concepts of seismic spectra and epicentral modulus are introduced and the relationship between them is discussed. ~~From which~~ the feasibility of predicting whether an earthquake of magnitude  $M_s \geq 6.0$  is likely to take place from an analysis of the seismic spectra and a study of the changes in the epicentral modulus recorded from an earthquake of magnitude  $M_s \geq 4.5$  is discussed, also, the feasibility of forecasting whether or not an earthquake of magnitude  $M_s \geq 6.0$  is likely to occur again from the study of the changes in epicentral modulus of an earthquake of magnitude 6.0.

Received 14 October 1975

AUTHOR: HSU Chi-an [1776 3444 1344]  
CHU Tsai-wan [2612 1363 8001]

ORG: Both of Institute of Physics, Academia Sinica

TITLE: "Estimation of the Conditions for Synthesizing A15 Type  $Nb_3Si$  at High Pressure"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 533-535

ABSTRACT: The compound of A15 type ( $A_3B$  type) has stirred up a wide-spread interest among those who are engaged in the study of the super-conductive materials. Especially the A15 type superconductive material of Nb family is known to possess a very high transition temperature. The feasibility of synthesizing A15 type  $Nb_3Si$  at a high pressure is discussed from the computation of the atomic radii of the elements involved at an elevated pressure and the following estimations are obtained. (1) At a pressure of less than 150 kb, formation of A15 type structure is unlikely. (2) A pressure of greater than 400 kb and preferably greater than 1000 kb is favorable for the formation of the A15 type structure according to the basis 1. (3) A pressure of greater than 800 kb is favorable for the formation of the A15 type structure according to the basis 2.

Received 31 December 1975

AUTHOR: None

ORG: New Materials Laboratory, Metallurgical Research Institute, Pao-t'ou Iron and Steel Corporation

TITLE: "On the Hysteresis Loops of Liquid-Phase-Sintered  $\text{SmCo}_5$  Permanent Magnet at Various Temperatures"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 536-540

ABSTRACT: The hysteresis loops of a liquid-phase-sintered  $\text{SmCo}_5$  permanent magnet at various temperatures were measured experimentally, from which  $4\pi M_r$ -T curve and  $H_{c1}$ -T curve and the time-wise variation of the loops were obtained. From these curves the phase composition as well as the influence of the various factors on  $H_{c1}$  were determined. The sample was aged at 300 °C and from the changes in the hysteresis loops measured at a regular interval the condition of constitutional change (aging) was determined. The sample was kept at a constant temperature (750-755 °C) which lies between the Curie temperatures of  $\text{SmCo}_5$  and  $\text{Sm}_2\text{Co}_{17}$  and from the changes in the hysteresis loops measured at a regular interval deposition of  $\text{Sm}_2\text{Co}_{17}$  phase was determined, from which an explanation of the fundamental reason for the drop in  $H_{c1}$  during a constant temperature treatment at 750 °C was attempted.

Received 9 April 1976

AUTHOR: LI Hsiao-yuan [2621 1420 3293]  
TU Tung-sheng [2629 2639 3932]  
WU Chi-min [0702 3444 3046]

ORG: All of Institute of High Energy Physics, Academia Sinica

TITLE: "A possible Meson Spectrum and the Production and Decay of the New Particles in the  $\text{SU}_3^{(1)} \times \text{SU}_3^{(2)}$  Model"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 541-545

ABSTRACT: The meson spectrum and the production and decay of the new particles in the  $\text{SU}_3^{(1)} \times \text{SU}_3^{(2)}$  structural model is discussed under the assumption that the Hamiltonian possesses an approximate  $\text{SU}_6$  constancy. The results indicate that a portion of the structure presented by the  $\text{SU}_3^{(1)} \times \text{SU}_3^{(2)}$  model does not contradict with the experimental results available today. However, there remain many serious problems from the theoretical consideration.

Received 5 November 1975

AUTHOR: None

ORG: Length Laboratory, The Chinese Institute for Metrology

TITLE: " A Laser Interferometer for Small Angle Measurement "

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA ] in Chinese Vol 25, No 6,  
Nov 76 pp546-548

ABSTRACT: An instrument for the measurement of small angles is described. The instrument is compact and light in weight and has a wide range of applications. It is designed to measure angles of less than  $5^\circ$  in magnitude. The instrument can discriminate an angle of magnitude as small as  $0''.27$  and its accuracy is  $\pm 0''.05$  for angles of magnitude less than  $1^\circ$ . The instrument measures the angle using the law of sine,  $\sin A = H/R$  where  $R$  is a constant of the instrument, by measuring  $H$ , the side opposite to the angle  $A$  of the right triangle, by means of the laser interferometry.

Received 1 July 1976

9113  
CSO; 4009

AUTHOR: SHEN Chueh-lien [3088 6030 3353]  
CHANG P'eng-hsing [1728 7720 5046]  
MO Yu-chun [5459 5148 0193]

ORG: None

TITLE: "Design Analysis for an Orthogonal-Loop-Coupling YIG Tunable Filter"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25,  
No 6, Nov 76 pp 465-471

TEXT OF ENGLISH ABSTRACT: An orthogonal-loop-coupling YIG tunable filter is analyzed by using the equivalent circuit. By introducing a suitable expression for the self-inductance of the coupling loop, applicable formulae for designing multi-stage YIG filters are given. Using these formulae, an example for designing the two-stage filter is presented. Also, the influence of the parameters of the coupling loops on the passband response is analyzed for a single-stage YIG resonance filter.

Received 9 February 1976

AUTHOR: CH' IEN Tsu-wen [6929 4371 2429]

ORG: None

TITLE: "On the Scattering of Sound by Sound"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 472-480

TEXT OF ENGLISH ABSTRACT:

The problem of the non-linear interaction between two fully collimated plane-wave beams travelling in different directions has given rise to much of the controversy to date as to whether the secondary scattered radiation exists outside the interaction region. Ingard et al. expressed the primary beams with a type of discontinuous function

$$\rho = \begin{cases} e^{k(\alpha - ky)}, & |x| < a, \\ 0, & |x| > a. \end{cases}$$

Through calculations, they claimed that a scattered radiation is shown to exist outside the region of interaction. Assuming primary fields are plane waves of infinite extent, Westervelt studied the same problem, but a negative conclusion was obtained. By dividing co-ordinate space into the inside and outside of the common volume, Al-Temimi solved Westervelt's equation for both cases and concluded that the two conflicting results could relatively be brought together.

Although in this paper only ideal beams interacting at right angles are discussed,

(continuation of WU-LI HSUEH-PAO Vol 25, No 6, Nov 76 pp 472-480)

the author suggests that this type of discontinuity can be more adequately described with a certain combination of unit-step functions. By applying and solving Westervelt's equation, the author obtains an interesting result, i.e., the secondary scattered radiations outside the common volume originate not from a volume source as claimed by Al-Temimi, but from a  $\delta$ -function surface-dipole. However, this surface source is artificial, because discontinuous functions which do not satisfy the homogeneous wave equation have been used to describe the primary waves. It is shown that the solution obtained by the author is the same as that of Al-Temimi, therefore, a relative agreement cannot be reached between the two conflicting results. A comment is also made on the latter's paper concerning the inappropriateness of the continuous conditions assumed at the boundaries. Based on the above discussions, the author predicts that if the primary beams are to be described by discontinuous functions, then the theories of the parametric transmitting and receiving arrays will be similarly affected.

Received 22 March 1974; received revised edition 26 March 1976

AUTHOR: SUN Hsin [1327 9515]

ORG: Department of Physics, Fu-tan University

TITLE: "A Phase Transition Model not in Accordance with the Scaling Law"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 487-493

TEXT OF ENGLISH ABSTRACT:

For a three-dimensional eight-vertex model with energy parameters satisfying the condition  $\epsilon_1 + \epsilon_2 = \epsilon_3 + \epsilon_4$ , all the critical exponents have been calculated:

$$\alpha = \alpha' = 0, \quad \beta = \frac{1}{4}, \quad \delta = 7, \quad \gamma = \frac{1}{2}, \quad \gamma' = \frac{3}{2}, \quad \nu = \nu' = 1, \quad \eta = \frac{3}{2}.$$

These do not satisfy the scaling law, the reason is that the correlative region of polarization contracts from the crystal planes  $(\bar{1}, 1, 1)$  and  $(\bar{1}, \bar{1}, 1)$  to the crystal axis  $[1, 0, 1]$  at the critical point.

Received 27 August 1975; received revised edition 9 February 1976

AUTHOR: HU Ning [5170 1380]

ORG: Physics Department, Peking University

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25, No 6, Nov 76 pp 494-506

TEXT OF ENGLISH ABSTRACT

An equation of the Bethe-Salpeter type is used to obtain the internal wave function of mesons. It is found that if the potential well between the straton and anti-straton is of the pseudo-scalar type, then the  $0^-$  and  $1^-$  mesons will satisfy the same approximate radial wave function, and thus lead to  $SU_3$  symmetry. We have shown previously that pseudo-scalar potential is the only single type of potential which leads to this symmetry. The potential is  $V = V_0 + V_1$ , where  $V_0$  represents a super-strong deep well, the effect of which is to reduce the very large mass  $M$  of the free straton to a small effective value. The motion of the straton inside the meson is therefore relativistic.  $V_1$  represents a small potential of the order of  $1/M$  of a simple harmonic oscillator. A tensor force is also introduced to account for the splitting of energy levels of the states with the same spin and orbital angular momentum. Our solutions for the ground and angular excited states of  $0^-$  and  $1^-$  mesons practically explain all the observed meson states. Our theory can apply equally to the baryon states if the phenomenological potential  $V_0$  is reduced by a factor of 2.

Received 11 March 1975

AUTHOR: LI Hua-chung [2621 5478 6945]  
KUO Shuo-hung [6753 4311 7703]  
HSI Ting-ch'ang [0405 7844 2490]

ORG: Li and Kuo of Physics Department, Chung-shan University; Hsi of Institute of High Energy Physics, Chinese Academy of Science

TITLE: "On the Problem of the Dual Charge of Non-Abelian Gauge Groups-----  
A Discussion on Magnetic Monopoles"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25,  
No 6, Nov 76 pp 507-513

TEXT OF ENGLISH ABSTRACT: Starting from the integral definition of gauge fields, and using a formula resembling the Gauss-Bonnet theorem -----a theorem in differential geometry on compact manifolds, we derive a general conjugate relationship between the gauge charge and the dual charge. The relation between electronic charge and the magnetic monopole is an example of this conjugate relationship. For an  $SO(3)$  gauge group with a  $U(1)$  group as its invariant subgroup, we obtain the 't Hooft monopole solution as a special solution, without introducing any concept of singular strings or any mechanism such as the spontaneous breaking of symmetries.

Received 3 May 1975

AUTHOR: HOU Po-yu [0186 0130 1342]  
TUAN I-shih [3008 0001 1102]  
KO Mo-lin [5514 1075 2651]

ORG: Hou of Northwest University, Tuan and Ko of Lan-chou University

TITLE: "Dual Charge of a Non-Abelian Gauge Field"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 25,  
No 6, Nov 76 pp 514-520

TEXT OF ENGLISH ABSTRACT: The gauge invariant expressions and relations of various physical quantities in the non-Abelian  $SU(2)$  gauge field, such as electric charge, dual charge (magnetic charge), electromagnetic field and massive vector field, are studied. The relation between magnetic charge and the large scale topological property of the isotopic directions of the charge operator is shown.

Received 21 June 1975

9129  
CSO: 4009

AUTHOR: LU Ch'uan-k'ang [7120 0356 1660]

ORG: Fu Tan University

TITLE: "Dispersion Relations of Collisionless Plasma Wave Guide"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26  
No 1 Jan 77 pp 64-71

ABSTRACT: A generalized solution to the boundary value problems of Boltzmann-Maxwells equations in sheet and rectangular collisionless plasma is proposed. The analysis is simplified by introducing a  $\delta$  function as the integral transformation of nucleus, so that all multi-dimensional dispersion relations in wave vector space can be reduced to one-dimensional dispersion relations, while the relations between wave patterns of bounded wave guide and boundless plasma is also clarified. It is established that in sheet plasma wave guide, besides the existence of waves corresponding to the TE and TM waves of vacuum wave guide, there exists also a second type of E wave, closely related to electrostatic waves. A discussion is also made on the three types of wave patterns of rectangular plasma waves. Finally the relativistic dispersion relations, and a correction value for the effect of relativistic mass on dispersion relations are obtained. Received 5 November 1975.

AUTHOR: LIN Wei-kan [2651 3634 1626]

ORG: None

TITLE: "Characteristic Impedance of a Coaxial Transmission Line Having a Circular Outer Conductor and a Rectangular Inner Conductor"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26  
No 1 Jan 77 pp 72-78

ABSTRACT: After a prior derivation of more direct and approximate results, the conformal transformation method is used to obtain the upper and lower limit of the characteristic impedance of coaxial transmission line having a circular outer conductor and a rectangular inner conductor. The results so calculated are tabulated in a table, and are found to be strict and accurate.

This paper was received for publication on 12 May 1975.

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WANG Wen-chün [3769 2429 0689]  
SHEN Chu-t'ung [3088 0031 0681]  
CH'EN Liang-ch'en [7115 5328 6591]

ORG: All of Institute of Physics, Chinese Academy of Sciences

TITLE: "Sintering of Polycrystalline Diamond"

SOURCE: Peking WU-LI SHUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26  
No 1 Jan 77 pp 79-82

ABSTRACT: The authors report a research on the sintering of polycrystalline diamond under varying pressure, and when blended with some metallic and nonmetallic elements. It was found that the higher the pressure, the easier and more efficient will be the sintering, that blending with graphite favors crystalline growth and intensification, and that there is distinct current and voltage changes in correspondence with the sintering process that deserves further research.

The authors thank Liu Shih-ch'ao [0491 0013 6389], Ch'eng Hsiang-jung

[continuation of WU-LI HSUEH-PAO Vol 26, No 1 Jan 77 pp 79-82]

[2052 0686 2837] and Wang Li-chün [3769 5461 0689] for support and assistance, and Sun Kuo-hsien [1327 1613 7359], Chang Hung-ping [1728 4767 0365] and Fan Hai-fu [5400 3189 4395] for assistance in the sample analysis.

This paper was received for publication on 5 April 1976.

AUTHOR: HOU Po-yü [0186 0130 1342]

ORG: Northwestern University

TITLE: "On the Structure of SU(2) Gauge Field"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26  
No Jan 77 pp 83-86

ABSTRACT: On the basis of the relations between SU(2) fiber bundle and U(1) sub-bundle, the author discusses three classes of SU(2) gauge field, namely: 1) discrete holomorphic groups; 2) holomorphic group is closure group  $H = U(1)$ , connection can be Abelianized, physically is pure electromagnetic field; and 3) holomorphic group is SU(2), connection cannot be reduced, physically is charged vector particles. The results can be generalized to structure group G, when rank r is larger than 1 of semi-simple Lie group.

The author thanks Wu Wen-chün [0702 2429 0193] and Liu Shu-lin [0491 2579 7792] of the Institute of Mathematics (CAS) for beneficial discussions, and to Ku Ch'ao-hao [6253 6389 6275] of Fu Tan University for correcting suggestions of the manuscript.

This paper was received for publication on 17 April 1976.

AUTHOR: KAO Ch'ung-shou [7559 1504 1108]

ORG: Department of Physics, Peking University

TITLE: "Cluster Effect of Charge Correlations in Multi-Pion Production During p-p Collisions"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26,  
No 1 Jan 77 pp 87-89

ABSTRACT: The author shows that in multi-pion production during p-p collisions, pions are most probably produced through clusters when isotropic spin is zero. When the clusters have  $\epsilon$  cluster of about 6/7 probability, and  $\omega$  cluster of about 1/7 probability, the multiple correlations of pion<sup>0</sup> and pion<sup>-</sup> can then be explained. Experimental and calculated results coincide within the energy range of 19 - 303 GeV.

This paper was received for publication on 30 September 1976.

AUTHORS: NI YÜ-ts'ai [0242 5148 2088]  
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ORG: NI of Chinese Research Institute of Metrology, and WANG of Kunming Machine Tool Plant

TITLE: "Precision Measurement of Refractive Index of Air by an Improved Rayleigh Interferometer"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1 Jan 77 pp 90-92

ABSTRACT: Rayleigh interferometer for the measurement of refractive index of air is improved by the addition of vacuum tube and compensator plate, and the adoption of white light zero fringe alignment, after which the refractive index of air is obtained from the reading. The drifting of zero is found to be very slight. The accuracy of measurement can reach  $4 \times 10^{-8}$ , when compared with values calculated by Edlén formula.

This paper was received for publication on 14 October 1976.

11,206  
CSO: 4009

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WANG Chia-chun [3769 4471 6511]  
WANG Hsiao-kuang [3769 2556 0342]

ORG: Worker-Peasant-Soldier Students, Department of Physics, Peking University

TITLE: "Analysis on the Decay Processes of the New Particle J(3095)"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1 Jan 77 pp 1-8

TEXT OF ENGLISH ABSTRACT:

A unified mechanism is proposed to explain the radiative decays and  $G$ -parity-conserving decays of the J particle into ordinary particles: According to this mechanism the J particle first decays into the intermediate state  $\phi_* = \alpha\phi_1 + \beta\phi_2$ , and then  $\phi_*$  decays into ordinary particles. The following results are obtained:

1. The predictions are in best agreement with the experiment if  $\phi_* \cong \omega$ , with the exception that the predicted ratio  $\Gamma(J \rightarrow \omega \rightarrow \eta\gamma)/\Gamma(J \rightarrow \omega \rightarrow \pi\gamma)$  is too small.
2. In order to fit both radiative decays and decays into two hadrons, the form factors for these two types of processes must differ by a factor  $10^2$ . Using the straton model a method for calculating these form factors is given which explains the above difference quite well.

[continuation WU-LI HSUEH-PAO Vol 26, No 1, Jan 77 pp 1-8]

3. Another possible mechanism of radiative decays of the  $J$  particle is also discussed, and some difficulties are pointed out.

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AUTHOR: CH'ENG Hsi-yu [4453 1585 2589]  
TENG Chih-fang [6772 6347 2455]

ORG: Worker-Peasant-Soldier Students, Department of Physics, Peking University

TITLE: "A Proposed Procedure for Determination the Decay Width  $\Gamma_{X \rightarrow 2\gamma}$  of the New Particle X(2800) to  $2\gamma$  by Coulumb Photo-production of this Particle"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1, Jan 77 pp 9-15

TEXT OF ENGLISH ABSTRACT:

The  $2\gamma$  width of X(2.8) which is observed as a decay product of J (3.095) can be determined from high energy Coulumb photoproduction of this particle on nucleons and nucleus. The pertinent Feynman diagrams are discussed, the related coupling constants are analyzed and estimated, and the differential photo-production crosssections from  $0-3^\circ$  of 50 and 100 GeV  $\gamma$  on proton (and also 100 GeV  $\gamma$  on the nucleus of lead) are calculated. The results show that if the decay width is not much less than 1 keV, then it can be determined accurately by this Coulumb photo-production measurement.

Received 30 September 1976

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TSENG Tao-kuei [2582 6670 2710]  
CHOU Ch'ang-ch'un [0719 7022 2504]

ORG: Worker-Peasant-Soldier Students, Department of Physics, Peking University

TITLE: "A Proposed Procedure for Experimental Determination of the Spin-parity of the New Particle X(3410)"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1 Jan 77, pp 16-21

TEXT OF ENGLISH ABSTRACT:

A procedure is proposed for the experimental determination of the spin-parity of the new particle X(3410). It consists of choosing the events representing the radiative decay  $\psi \rightarrow X(3410) + \gamma$  from the  $\psi$ -production experiment at  $\sqrt{s} = 6.84$  GeV, and measuring the angular distribution of the  $\gamma$  photon produced in the process, and also the energy distribution of two pseudo-scalar mesons from the subsequent decay of X. The result of calculation shows that the spin-parity of X(3410) can be determined with certainty and good sensitivity.

Received 30 September 1976

AUTHOR: HSIN Hsien-chieh [1823 6343 2638]

ORG: None

TITLE: "A Frequency Spectrum Analyzer for Single Transient Processes"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1 Jan 77 pp 22-33

TEXT OF ENGLISH ABSTRACT:

The principles and experimental results of a frequency spectrum analyzer for all types of single transient processes are described in this paper. By the suitable combination of existing laboratory instruments and a few special circuits which are described here, the analyzer may be assembled fairly quickly. By using time expansion (or compression) techniques, the frequency spectrum of interest may be transferred to any frequency band. The single transient is reproduced as a repetitive waveform by means of a photoformer. In this way it is possible to use an ordinary low frequency spectrum analyzer to measure the frequency spectrum of single transient processes of any type or duration. Experimental results prove that the above method is applicable. For the principal compositions of the spectrum, measurements may attain an accuracy of 2-3%. The accuracy for minor compositions of the spectrum is somewhat less.

Received 12 June 1975

AUTHOR: HSI-MEN Chi-yeh [6007 7024 4764 2814]

ORG: None

TITLE: "The Electron Optical Properties and Aberration Theory of a Combined Magnetic Round Lens and Deflection System"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] in Chinese Vol 26, No 1 Jan 77 pp 34-53

TEXT OF ENGLISH ABSTRACT:

A combined magnetic round lens and deflection system with a superimposed field has been studied, and the power series expressions for the magnetic field is given. The electron trajectories are described in vector-form, and the Gaussian optical properties of the combined system discussed. By means of Fermat's principle general aberration formulae for the combined system have been derived. Equations for calculating the third-order aberration are given in compact matrix-form, hence they are suitable for numerical computation. This paper attempts to give a general theory of the combined system to provide guidance for designers of cathode ray tubes and electron optical instruments.

Received 21 February 1975

AUTHOR: CHANG Tsung-yeh [1728 1350 8763]  
CHAO Wei-ch'in [6392 4850 0530]  
LI Kuang-lieh [2479 0342 3525]

ORG: Institute of High Energy Physics, Chinese Academy of Science

TITLE: "Some Sub-Structures of Many-Particle Correlation in Nuclei"

SOURCE: Peking WU-LI HSUEH-PAO [ACTA PHYSICA SINICA] In Chinese Vol 26, No 1 Jan 77 pp 54-63

TEXT OF ENGLISH ABSTRACT:

The coherent structures of two phonons have been proposed as the sub-structure  $\alpha^+$  of four-particle clusters for the light nuclei. In the same way the sub-structure  $\beta^+$  of four-hole clusters can also be given. Based on this the sub-structures between particle clusters and hole clusters in  $^{16}\text{O}$  and  $^{18}\text{O}$  have been chosen as examples for our investigation. It is found that there is a very strong repulsive force between them. Therefore the loose structure between particle cluster and hole cluster is of the lowest energy state. In this way, the deformations of these states have been explained from the microscopic structures. Moreover, these structures can coherently strengthen the  $E2$  transition. Further in order to study the particle correlation in the medium nuclei, the  $L-S$  coupling coherent structure is extended to the pseudo  $L-S$  coupling coherent structure and the expressions are given in the  $j-j$  coupling repre-

[continuation of WU-LI HSUEH-PAO Vol 26, No 1, Jan 77 pp 54-63]

sentation. Some preliminary analyses are made for the nuclei around  $^{56}\text{Ni}$  by using these structures.

Received 11 June 1975

9129

CSC: 4009

PHYSICS

AUTHOR: None

ORG: Peking People's Machinery and Equipment Plant

TITLE: "Working Class is the Main Force in the Scientific Research Front  
-- Some Thoughts on the Fixing of Printing Machines with Laser"

SOURCE: Peking WU-LI [PHYSICS] in Chinese Vol 5 No 6, Dec 76 pp 320-321

ABSTRACT: This article relates the process of the development of a laser concentric collimator that will automatically correct the wall plates in printing machines. Consisting essentially of a high precision collimation telescope, a plane reflector, and a photoelectric receiving system, the collimator is constructed by the insertion of two concentric sleeves with concentric holes into the concentric holes of two wall plates, when adjustment of all the concentric holes in a straight line gives reliable collimation result. The development was conducted in coordination with the Laser Laboratory of the Peking Industrial University. The achievement is attributed to the Party leadership, and adherence to the "three combination", "reliance on working class", and "mass movement" principles.

AUTHOR: None

ORG: Earthquake Research Group, Tientsin T'ang-shan Eighth High School

TITLE: "The Heaven May Fall, The Earth May Collapse, But Nothing will Change Our Determination to Carry Out Earthquake Monitoring and Self-Reliant Earthquake Prediction"

SOURCE: Peking WU-LI [PHYSICS] in Chinese Vol 5, No 6, Dec 76 pp 322-324

ABSTRACT: Following a review of the expansion of the spare time earthquake research group from one teacher and two students in 1972 to the almost 100 members prior to the great T'ang-shan earthquake, their development of models DD1 to DD6 earthquake conductometer, scintillation digital radon meter, and other seismologic instruments by self-reliance, the establishment of earthquake specialized classes, and their repeated correct earthquake forecasting up to the great T'ang-shan earthquake at the Tientsin T'ang-shan Eighth High School, the article cites a series of episodes of the school members' determinations and heroic deeds during and after the great T'ang-shan earthquake.

AUTHOR: None

ORG: Earthquake Forecast Group, Peking Second Yu-an-men High School

TITLE: "Under the Radiance of Mao-Tse-tung Thought. Earthquake Monitoring and Prediction Must be Conducted Conscientiously for the Revolution"

SOURCE: Peking WU-LI [PHYSICS] in Chinese Vol 5 No 6, Dec 76 pp 324-327

ABSTRACT: This article reviews the development and achievement of the Earthquake Prediction Group of the Peking Yu-an-men Second High School since its establishment in 1973 that includes: 1) establishment of a system of observation stations to record water levels, terrestrial current, ground water temperature, electromagnetism, and animal behavior; 2) promotion of earthquake knowledge, and organization of two earthquake specialized classes, and 3) development of 7 crude instruments by self-reliance to automatically measure gravity, earth temperature, ground humidity, water conductance, terrestrial stress, and others. Due to the above, the group had accurately predicted the great Hai-ch'eng earthquake in February 1975, and the great T'ang-shan earthquake in July 1976 on the basis of the various anomaly observed.

AUTHOR: None

ORG: Kwangtung Magnetic Treatment of Water Research Collaboration Group

TITLE: "In Accordance with the Policy of Taking Agriculture as the Foundation, Develop Experimental Research on the Application of Magnetically Treated Water to Agriculture"

SOURCE: Peking WU-LI [PHYSICS] in Chinese Vol 5 No 6, Dec 76 pp 328-330

ABSTRACT: This article reports a series of experiments on the effect of magnetically treated water on the growth and production of such crops as rice, wheat, soya bean, peanut, vegetable, red duckweed and hemp. The results prove that magnetically treated water promotes seed sprouting, improves seedling quality, stimulates shooting, increases crop yield, and strengthens resistance to coldness. Instrumental and chemical analysis further proves that magnetically treated water changes the structure of the crystal granules of impurities, promotes absorption of light, reduces iron ions, increases protein contents, promotes rate and quality of sprouting better than hormones, and increases the solubility of fertilizers.

AUTHOR: None

ORG: Tientsin Bureau of Metrology and Tientsin Pao-ti Hsien Bureau of Metrology

TITLE: "With Class Struggle as the Keylink, Push Ahead Scientific Experiment in the Use of Magnetically Treated Water in Agriculture"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 331-333

ABSTRACT: Based on the experimental results that magnetically treated water can increase the yield of winter wheat by 6-21.2 percent, leeks by 24.74 percent, celery by 31.18 percent, persimmon by 12-20 percent, and tomato by 37.2 percent, this article advocates promotion of magnetically treated water in agriculture, further experiments on the technique, development of more and better water magnetizer, and research on its effect on soils, geodynamics and plant absorption.

AUTHOR: None

ORG: Laser Section, Quantum Laboratory, Chinese Research Institute of Metrology

TITLE: "Wavelength in Vacuo and Reproducibility of 6328Å Helium-Neon Laser"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 334-335

ABSTRACT: A series of experiments on the wavelength in vacuo and reproducibility of 6328Å He-Ne (7:1) laser concludes that in the exclusion of laser wavelength aged drifting, the reproducibility of laser wavelength is normally better than  $5 \times 10^{-8}$ , but in the existence of wavelength aged drifting, the change in wavelength is around  $3-4 \times 10^{-8}$ . It is estimated that when the laser light intensity exhibits no distinct weakening, its wavelength aged drifting will not normally surpass  $5 \times 10^{-8}$ .

AUTHOR: None

ORG: Tientsin Motive Power Machinery Plant Metrology Laboratory and  
Tientsin Nan K'ai University Department of Physics's Optics Specialty

TITLE: "Measurement of the Degree of Surface Finish by Laser"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 336-338

ABSTRACT: This article introduces the performance theory and various techniques of using laser to measure the degree of surface finish by matching reflection light intensity, scattered light intensity or photoelectric reception with known standards. A discussion is also made on the ever broader applications of the new technique in the measurement of workpieces of different shapes as well as inside surfaces.

AUTHOR: HSU Chi-jen [1776 4480 0088]

ORG: Institute of Physics, Chinese Academy of Sciences

TITLE: "Dissociation of Molecules by Pulsed Infrared Laser -- A Simple Approach to the Separation of Isotopes"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 339-341, 338

ABSTRACT: The author reviews recent research on the dissociation of molecules by pulsed infrared laser by imparting molecular collisions, increasing the power of laser, and synchronizing of laser pulse, the advances in modern laser apparatus, instruments and experimental techniques, and the improvement in physical models to simulate the molecular dissociation. A discussion is finally made on the significance of applying the technique to the isolation of isotopes, and initiation of excited chemical and biological reactions in the future.

AUTHOR: LIU Tzu-chang [0491 1311 4545]

ORG: Chemistry Teaching and Research Section, Szechwan Agricultural College

TITLE: "Some Views on the Research on Magnetically Treated Water"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 351-352

ABSTRACT: The author proposes some revisions concerned with an article entitled: "Experiments and Tests of Magnetically Treated Water", as published in No 1, 1976 of this journal, namely: 1) treatment of magnetic field of the water should not be limited to physical methods only; 2) experiments and tests of magnetically treated water should be coordinated and not isolated; 3) study of anti-scale measures from magnetically treated water should be primarily accurate control of magnetizing parameters and intensity of magnetic fields; and 4) advocates the adoption of conductance technique to test the magnetizing of water.

AUTHOR: YANG Ch'ung-hao [2799 1504 6375]

ORG: Hopeh Han-tan Thermal Power Plant

TITLE: "Discussion on the Mechanism of a Processor for the Magnetic Treatment of Water"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 352-356

ABSTRACT: The author discusses the mechanism of the magnetization of water on the basis of the composition or constituents of magnetized and unmagnetized water, and the association of water molecules and other constituents, and the dissociation of associated water, and the conversion of  $\text{Ca}(\text{HCO}_3)_2$  into  $\text{CaCO}_3$ , whereby some major parameters essential to the design of processors for the magnetic treatment of water and scale prevention are derived.

AUTHOR: None

ORG: Magnetically Treated Water Experimental Group, Liao-ning Bureau of Metrology

TITLE: "Probing the Mechanism of Increased Crop Growth Stimulated by Magnetically Treated Water"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5, No 6, Dec 76 pp 356-358, 350

ABSTRACT: The author attempts to explain the mechanism of increased crop growth stimulated by magnetically treated water, on the basis of its facilitating the ionization of salts in water, promoting absorption of water by plant cells, and favoring photosynthesis in plants, and the chemical reactions involved.

AUTHOR: TUNG Chün [5516 0193]

ORG: Fukien Shun-ch'ang Hsien's P'u-shang Commune's Lien-k'ang Production Brigade Intellectual Youth

TITLE: "Relativity and the Principle of Invariability of the Speed of Light"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 359-362

ABSTRACT: From the standpoint of materialistic dialectics, the author discusses relativity and the principle of invariability of the speed of sound that covers the origin of the principle of invariability of sound, experiments on the speed of sound prior to the theory of relativity, the two fundamental assumptions in the theory of relativity, and the essence of the theory of relativity and its relations to the experiments on the speed of sound. It is concluded that, since the development of high energy particle accelerators, advances in cosmic ray research, and establishment of the quantum theory, newer interpretation of the transformation relations may lead human knowledge to a newer understanding of the universe.

AUTHOR: LU Chü-fu [4151 3515 3940]

ORG: Hupei Shih-yen-shih Shih-yen High School

TITLE: "Concept of Pure Relative Motion Should be Criticized"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 362-364

ABSTRACT: The author analyzes the concept of pure relative motion from Newton to Einstein, in an effort to criticize Einstein's mistake in regarding the relativity of motion as absolute, and concludes that motion is the unity of opposites of relativity and absolute.

AUTHOR: LIU Po-wen [0491 0590 2429]

ORG: Kwangsi Nan-ning Ninth High School

TITLE: "The Space-Time Concept of Physics Must be Reformed"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 364-366

ABSTRACT: The author criticizes the inadequacy of the time-space concept in physics for reasons that the speed of sound is not the main problem of the time-space concept in physics, that the time-space concept in physics is not realistic, and that on the basis of modern discovery and scientific advances, the space-time concept, indivisibility of matter, and no sequence distinguishment are all out-of-date, and must be reformed with concept fully recognise the real essence of time and space, the divisibility of matters, and distinguishment of sequences.

AUTHOR: LAN Ch'un [3663 5028]

ORG: Lanchow University

TITLE: "On the Limitations of the Space-Time Concept in the theory of Relativity"

SOURCE: Peking WU-LI [PHYSICS] in Chinese, Vol 5 No 6, Dec 76 pp 367, 346

ABSTRACT: The author discusses the limitations of the space-time concept in the theory of relativity, and emphasizes the importance of one to carefully and comprehensively analyze all these problems for a better recognition of the true forms of existence of matters to continuously approaching the absolute truth.

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CSO: 4009

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