Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 1: *Basic Research*					R-1 Program Element (Number/Name) PE 0601108F / *High Energy Laser Research Initiatives*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	12.103	14.795	15.085	0.000	15.085	15.397	15.703	16.017	16.342	Continuing	Continuing
615097: *Joint Directed Energy Basic Research*	-	12.103	14.795	15.085	0.000	15.085	15.397	15.703	16.017	16.342	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program funds basic research aimed at developing fundamental scientific knowledge to support future Department of Defense Directed Energy Weapon systems through the Joint Directed Energy Transition Office. This program funds multi-disciplinary research institutes to conduct research on laser, laser beam control and high power microwave technologies. In addition, this program supports educational grants to stimulate student interest in directed energy and encourage graduate research in topics related to high energy lasers and high power microwaves. These educational grants are used for educational tools, scholarships, and summer intern employees in military laboratories. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

In FY 2021, Project 615097 is renamed from High Energy Research Initiatives to Joint Directed Energy Basic Research. This project name change reflects the direction in the 2017 and 2018 National Defense Authorization Acts.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

This program is in Budget Activity 1, Basic Research because this budget activity includes scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs.

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B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	13.016	14.795	15.090	0.000	15.090
Current President's Budget	12.103	14.795	15.085	0.000	15.085
Total Adjustments	-0.913	0.000	-0.005	0.000	-0.005
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.478	0.000			
• Other Adjustments	-0.435	0.000	-0.005	0.000	-0.005

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Directed Energy Sources and Devices	5.598	6.766	6.910
Description: Improve the fundamental understanding and modeling of high energy laser and high power microwave sources and devices. ***FY 2020 Plans:*** Continue investigations into innovative laser technologies, in diode-pumped lasers, fiber, and solid state laser technologies. Continue investigations into innovative microwave technologies, in microwave sources, antennas, and related microwave component technologies. Continue overseas efforts to leverage international technology advancements. Continue investigations into innovative high power laser and high power microwave technologies. ***FY 2021 Plans:*** Continue investigations into innovative laser technologies, in diode-pumped lasers, fiber, and solid state laser technologies. Continue investigations into innovative microwave technologies, in microwave sources, antennas, and related microwave component technologies. Continue overseas efforts to leverage international technology advancements. Continue investigations into innovative high power laser and high power microwave technologies. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 increased compared to FY 2020 by $0.144 million. Justification for the increase described in the plans above.			
Title: Directed Energy Propagation Technologies	5.461	6.779	6.925

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Improve the fundamental understanding and modeling of beam control technologies as they relate to high energy laser applications and high power microwaves. Conduct research in atmospheric characterization, metrology, control systems, algorithms, waveguides, antennas and beam control component technology. ***FY 2020 Plans:*** Continue research of innovative high energy laser and high power microwave beam control architectures. Continue to leverage international research developments and technology advancements. ***FY 2021 Plans:*** Continue research of innovative high energy laser and high power microwave beam control architectures. Continue to leverage international research developments and technology advancements. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 increased compared to FY 2020 by $0.146 million. Justification for the increase is described in the plans above.			
Title: Directed Energy Education ***Description:*** Fund educational grants to stimulate student interest in directed energy. ***FY 2020 Plans:*** Continue to provide scholarships and internships to support college students studying in fields related to high energy lasers and high power microwaves. Continue to provide grants to the United States Service Academies to stimulate studies related to high energy lasers and high power microwaves among military cadets. Continue to fund publication of journals and support continuing education for professionals in the high energy laser and high power microwave fields. ***FY 2021 Plans:*** Continue to provide scholarships and internships to support college students studying in fields related to high energy lasers and high power microwaves. Continue to provide grants to the United States Service Academies to stimulate studies related to high energy lasers and high power microwaves among military cadets. Continue to fund publication of journals and support continuing education for professionals in the high energy laser and high power microwave fields. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Not applicable	1.044	1.250	1.250
Accomplishments/Planned Programs Subtotals	12.103	14.795	15.085

D. Other Program Funding Summary ($ in Millions)

N/A

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D. Other Program Funding Summary ($ in Millions)

Remarks

E. Acquisition Strategy

N/A