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13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON David Schuster
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU	19b. TELEPHONE NUMBER 773-702-2733

RPPR Final Report
as of 29-Aug-2019

Agency Code:

Proposal Number: 68605PHRIP

Agreement Number: W911NF-16-1-0223

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Report Date: 31-Jul-2017

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Final Report for Period Beginning 01-May-2016 and Ending 30-Apr-2017

Title: Quantum Optics at 100GHz

Begin Performance Period: 01-May-2016

End Performance Period: 30-Apr-2017

Report Term: 0-Other

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Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees:

STEM Participants:

Major Goals: Develop 100GHz single-photon-level spectroscopy system, for novel mmwave circuit QED platform & optical-to-mmwave interconnection via Rydbergs.

Accomplishments: We developed a 100GHz single-photon-level spectroscopy system, for novel mmwave circuit QED platform & optical-to-mmwave interconnection via Rydbergs. We have thus far employed this system to develop 2D NbN, bulk Nb, and Nb-coated-Si photonic crystal 100GHz cavities.

The 2D NbN cavities exhibit high kinetic inductance and are thus ideal as weakly nonlinear devices to be employed for 10<->100GHz interconversion.

The bulk Nb resonators are seamless with a mode volume of approximately $0.2\lambda^3$, with finesses of 3×10^7 , making them ideal for optical/mmwave joint quantum optics experiments.

Nb-coated-Si photonic crystal cavities demonstrate that micromachining is a viable approach for creating high quality factor cavities.

Training Opportunities: Nothing to Report

Results Dissemination: Nothing to Report

Honors and Awards: Simon receives PECASE through DOE.

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

RPPR Final Report
as of 29-Aug-2019

Participant Type: Graduate Student (research assistant)

Participant: Aziza Suleymanzade

Person Months Worked: 2.00

Funding Support:

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

Participant Type: PD/PI

Participant: Jonathan Simon PhD

Person Months Worked: 1.00

Funding Support:

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

Participant Type: PD/PI

Participant: David Schuster PhD

Person Months Worked: 1.00

Funding Support:

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

Nothing to report in the uploaded pdf (see accomplishments)