PML's Joint Institutes

CARL WILLIAMS, ACTING DIRECTOR PML

NIST National Institute of Standards and Technology U.S. Department of Commerce

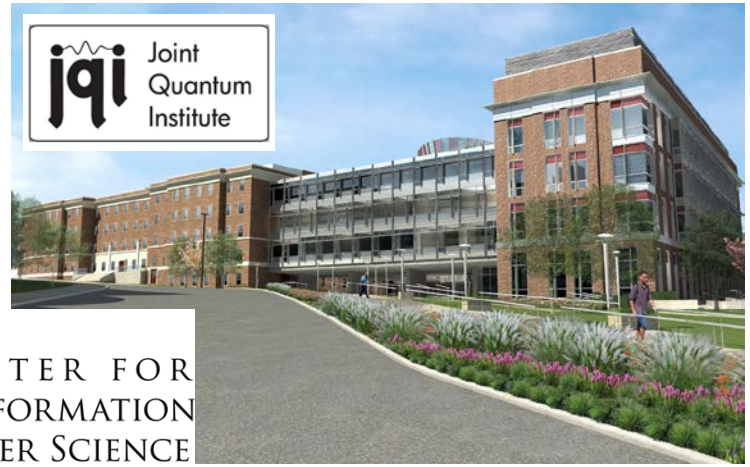
PML

PML's Joint Institutes

PML has two Joint Institutes:

- JILA founded in 1962 as the "Joint Institute for Laboratory Astrophysics" – it was the first government/university partnership
- Joint Quantum Institute (JQI) founded in 2006 – modelled in part on JILA

In 2014, PML together with ITL extended our relationship with UMD by establishing the Joint Center for Quantum Information in Computer Science (QuICS)



JOINT CENTER FOR
QUANTUM INFORMATION
AND COMPUTER SCIENCE

JILA

28 JILA Fellows (10 NIST, 18 CU):

- NIST Fellows hold Adjoint CU Faculty Appointments
- PML's Quantum Physics Division is the NIST part of JILA

- Started with a focus on laboratory astrophysics
- Today JILA is a leading research center including:
  - Astrophysics
  - Atomic and Molecular Physics
  - Biophysics
  - Chemical Physics
  - Laser Physics
  - Nanoscience
  - Precision Measurement
  - Quantum Information
- Currently ~300 people, including students, postdocs, technicians, administrators, and scientists

Joint Quantum Institute: JQI

- Joint institute of NIST and the University of Maryland with the participation and support of NSA
- 30 JQI Fellows (13 NIST, 16 UMD, and 1 LPS)
  - NIST JQI Fellows hold Adjunct UMD faculty appointments
- 180 people, and still growing
- Today the JQI is a leading and *the largest center* for quantum science in the U.S.
- Research activities includes:
  - Cold quantum matter (AMO Physics)
  - Quantum matter and materials (Condensed Matter Physics)
  - Quantum Information

Labs of the JQI
College Park, Maryland

JC for Quantum Information in Computer Science

- Joint institute of NIST and the University of Maryland with the participation and support of NSA
- 13 QuICS Fellows (6 NIST, 6 UMD, and 1 NSA)
  - NIST JQI Fellows hold Adjoint UMD faculty appointments
  - 5 Fellows (4 NIST and 1 UMD) are joint with the JQI
- 27 students, 13 postdocs, and visitors
- Already recognized as a leading center for quantum information in computer science:
  - How does quantum mechanics inform the theory of computation and communication?
  - What insight does computer science shed on quantum computing?
  - What are the consequences of quantum information theory for fundamental physics?
  - How can theoretical advances in computation and communication be applied?

JOINT CENTER FOR QUANTUM INFORMATION AND COMPUTER SCIENCE

QuICS
College Park, Maryland

Publications of JILA and Impact

<u>All Articles:</u>

8089 articles with an h-index=228

364,960 citations, avg. 45/article

2016: 258 articles 17849 citations

2017: 205 articles 18098 citations

QIS articles:

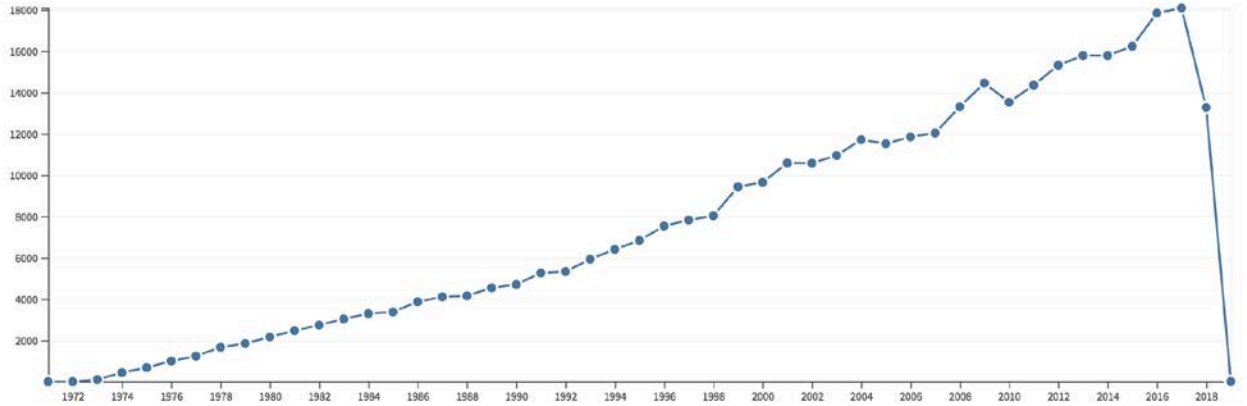
685 articles with an h-index=90

36546 citations, avg. 53/article

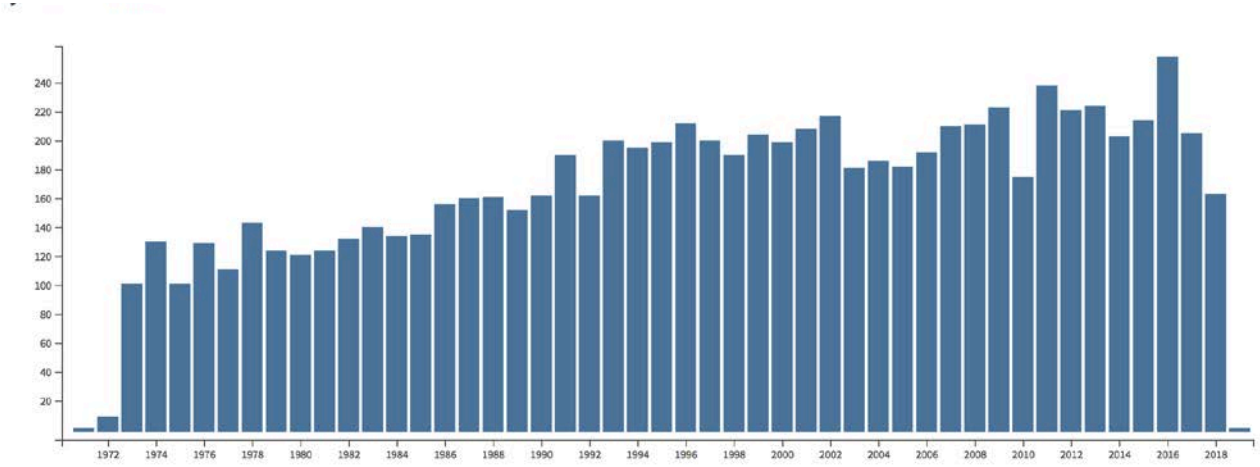
2016: 53 articles 3548 citations

2017: 43 articles 3585 citations

Times Cited per Year: Web of Science Oct 12, 2018



Publications per Year (8089 total): Web of Science



Publications of JILA and Impact since 2007

<u>All Articles since 2007:</u>

2546 articles with an h-index=112

65,606 citations, avg. 26/article

2016: 258 articles 9410 citations

2017: 205 articles 9914 citations

QIS articles:

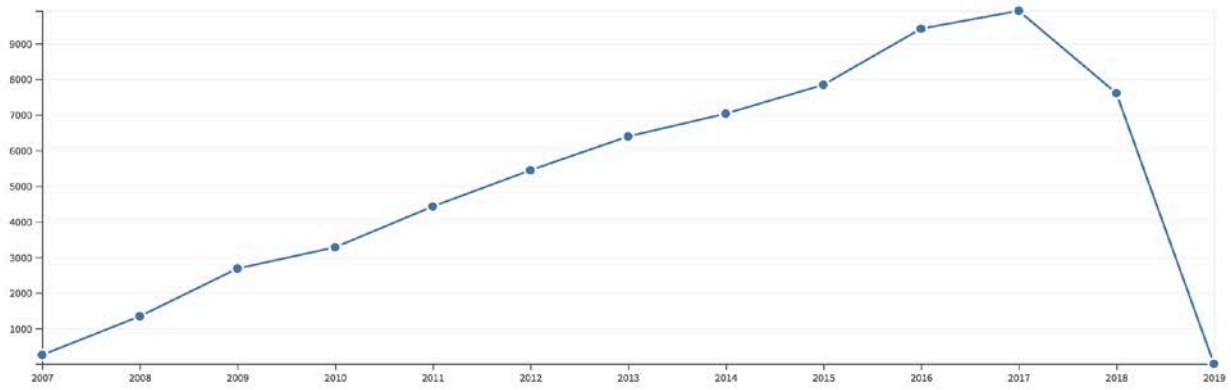
445 articles with an h-index=66

18557 citations, avg. 42/article

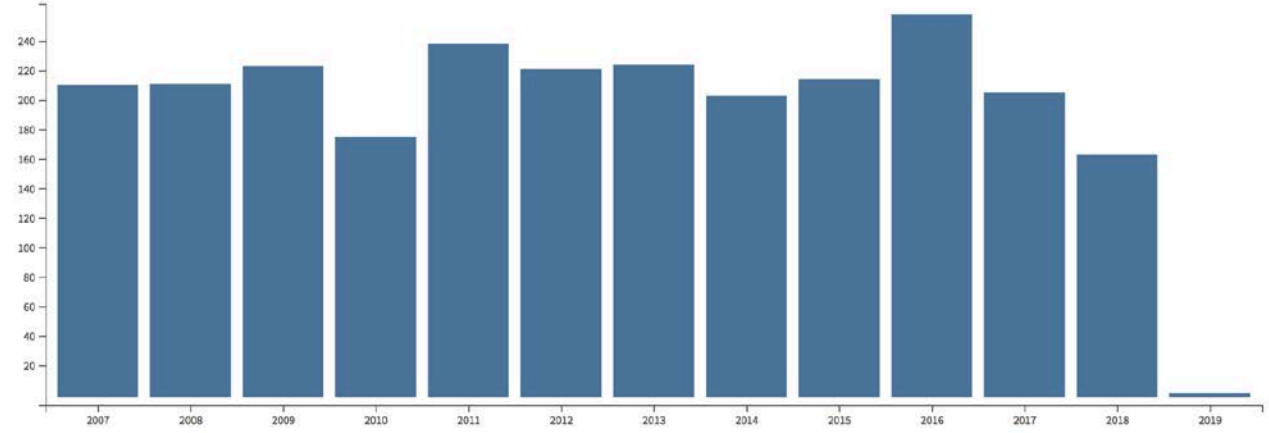
2016: 53 articles 3548 citations

2017: 43 articles 3585 citations

Times Cited per Year: Web of Science Oct 12, 2018



Publications per Year (8089 total): Web of Science



Publications of JQI

<u>All Articles since 2007:</u>

1733 articles with an h-index=100

50833 citations, avg. 29/article

2016: 184 articles 8126 citations

2017: 216 articles 8562 citations

QIS articles:

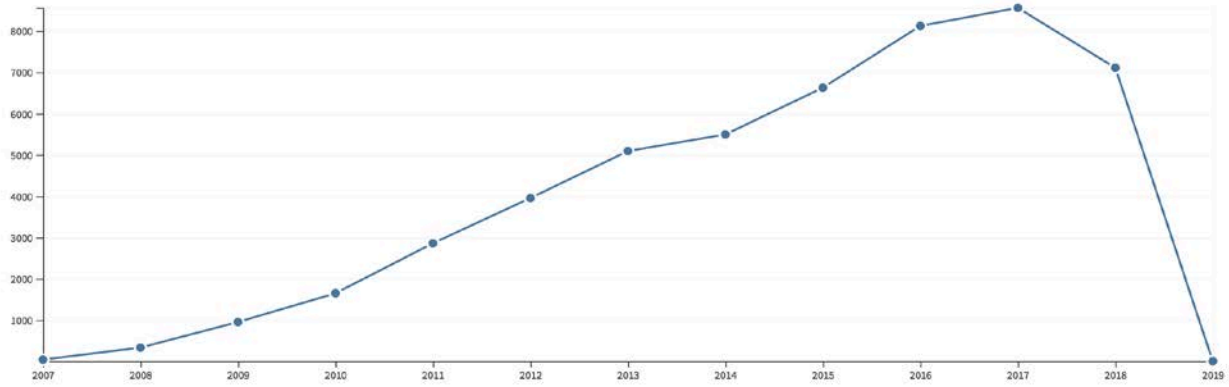
662 articles with an h-index=72

26931 citations, avg. 41/article

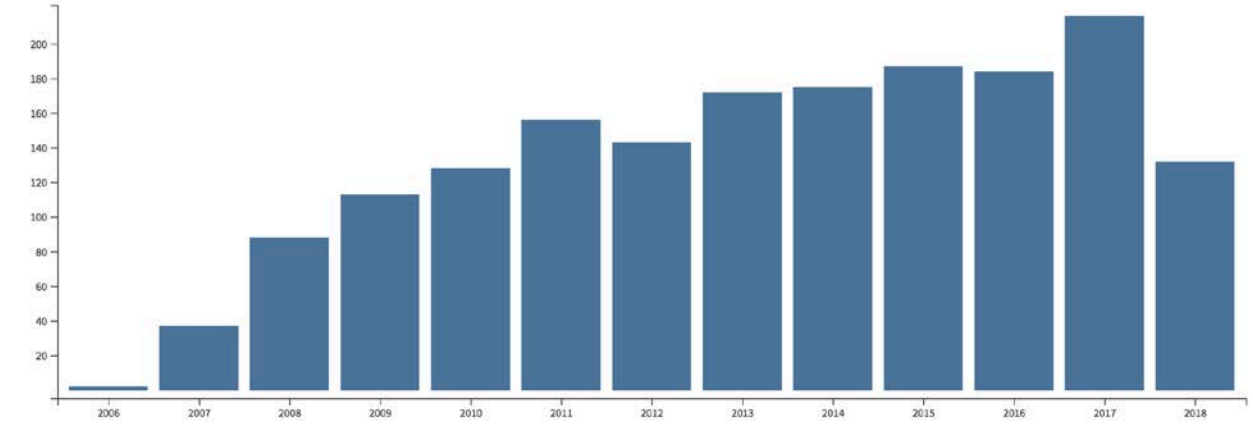
2016: 73 articles 4324 citations

2017: 94 articles 4643 citations

Times Cited per Year: Web of Science Oct 12, 2018



Publications per Year (8089 total): Web of Science



Conclusions

- Both JILA and the JQI are world class and prolific
- According to US News and World Report of US Graduate Physics Programs:
  - CU ranks 2nd in AMO, 6th in Quantum, and 14th in all of Physics
  - UMD ranks 6th in AMO, 6th in Quantum, 11th in CM, and 14th in all of Physics
- Both JILA and the JQI have an NSF Physics Frontier Center: Only 11 of these prestigious center exist
- Both produce highly trained students and postdocs
- JILA has a long history of spin-off of technology companies while JQI only has IonQ

QUESTIONS?