Welcome to the IQ Initiative/PITT PACC Workshop: Axions, Fundamental and Synthetic

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Interdisciplinary Quantum Initiative
Department of Physics and Astronomy

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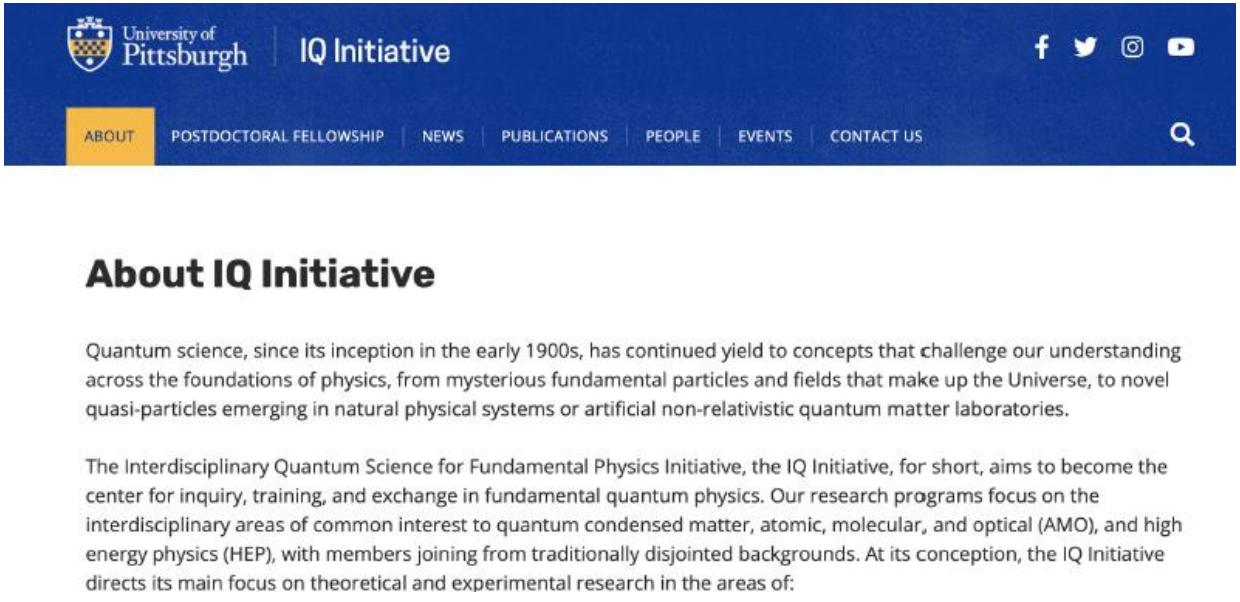
What is IQ Initiative

- **Interdisciplinary Quantum Science for Fundamental Physics Initiative [IQ]**
- **Created** in August 2022
- **Website** *under construction* http://iq.pitt.edu/



Who are we?
IQ People

Members

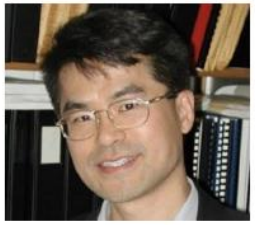
Brian Batell »
th, HEP

Gurudev Dutt »

Ayres Freitas »

Sergey Frolov »

Tao Han »



Hong Koo Kim »

Arthur Kosowsky »

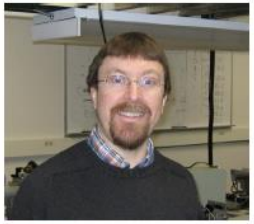
Adam Leibovich »

W Vincent Liu »
IQ Director (2022-2027)

Vittorio Paolone »
HEP

Hrvoje Petek »

Vladimir Savinov »



David Snoke »

David Wallace »

Andrew R Zentner »

Postdoctoral Fellow

Amit Bhoonah »

- **Steering: Hrvoje Petek (chair), Brian Batell, W. Vincent Liu, Vittorio Paolone**
- **Advisory: Tao Han, Adam Leibovich**

IQ People Background

- Multiple disciplinary
  - Non-relativistic quantum physics: qCM + AMO +QIS
    - Quantum Quantum CM
    - AMO
    - Q information science
    - Artificial “engineered” quantum simulators
  - Nano Engineering
  - High Energy Physics
  - Astrophysics
  - Philosophy of Science
- Experiment, Theory, & Computation
  - HEP experimentalists and theorists
  - Quantum exp and theorists

IQ Mission

Goal: to become the center for

inquiry, training, and exchange

in fundamental quantum physics

Stimulating ideas from High Energy, Cosmology, and Astro physics

to

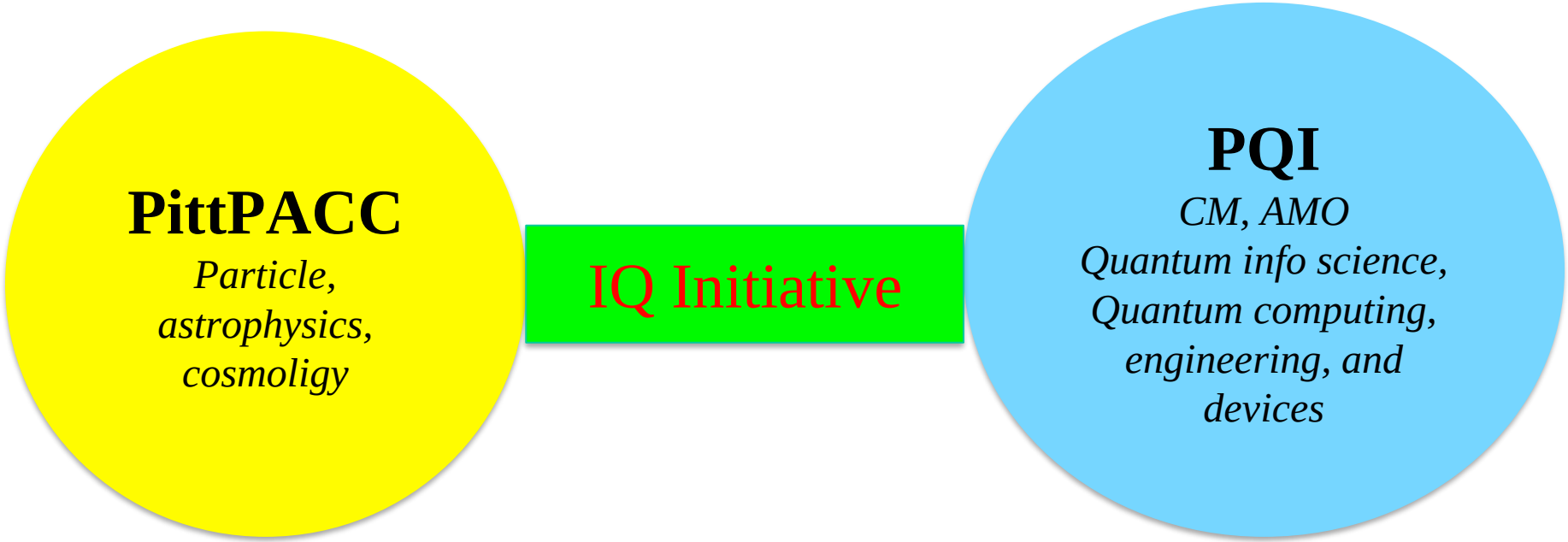
Condensed Matter & AMO physics, Quantum Info Science & Engineering

and back!

IQ Areas

- Interdisciplinary Work: qCM+ AMO+ HEP
- Fundamental physics:
  - Probes new physics beyond the Standard Model of particle physics through precision many-body measurements by table-top experiment
  - *Targets low energy scale ---complementary to high energy accelerators …*
- Quantum Simulation:
  - Emergent analogues of fundamental particles in quantum simulation platforms.
  - Realization of QFT concepts by next-generation quantum materials and technologies.
- Quantum system inspired problems for Particle Physics
  - Particle physics theory in particular
  - Particle & Astro-physics exp design

IQ as Quantum-HEP Bridge



University of Pittsburgh Physics, Astrophysics and Cosmology Center

Pittsburgh Quantum Institute

Pittsburgh made the *National Geographic Traveller*'s 19 for 2019 Cool List. The British edition of the publication names Pittsburgh as a destination set to hit the headlines in 2019. Pittsburgh, the only U.S. city to make the list, was ranked third among the coolest places to travel in the coming year.

This Workshop

GOALS

1.Novel ideas for axion detection using quantum systems.

2.Overview of exciting developments in the rapidly emerging field of axion electrodynamics in condensed matter systems.

3.Bring together people working on these two disparate topics for creative new ideas & collaborations both in fundamental axion detection and the emergence of axionic quasi-particles in materials.

Thank you all !

Look forward to & wish you a fruitful workshop!