



**Subatomic Physics Institute**  
Physics and Engineering Physics  
University of Saskatchewan

## Research in:

- Experimental Photonuclear Physics
- Quantum Entanglement
- Particle Physics Theory & Phenomenology
- Particle Astrophysics & Cosmology
- Accelerator Physics
- Health Physics



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# Experimental Photonuclear Physics

Kolb, Pywell, Igarashi, Bergstrom

Experimental work conducted using:

- **High Intensity Gamma Source (HIGS)** at the Duke University Free Electron Laser Laboratory, Durham, North Carolina.
- **Thomas Jefferson National Laboratory (JLab)**, Continuous Electron Beam Accelerator Facility, Newport News, Virginia (the BigBite collaboration).



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## Experimental Photonuclear Physics

Tests of the Fundamental Properties of the particles that make up the atomic nucleus

- Neutrons, Protons, Pions, etc.

Tests of our understanding of the forces between these particles

- Quantum Chromodynamics (QCD)
-

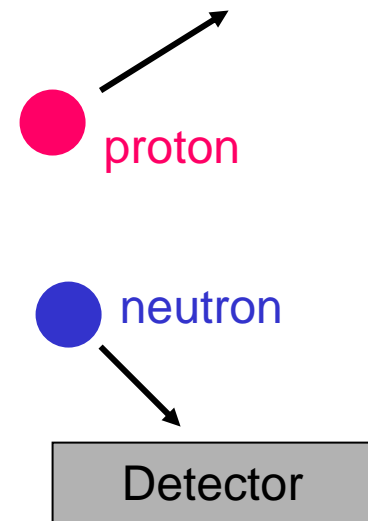


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## Experimental Photonuclear Physics

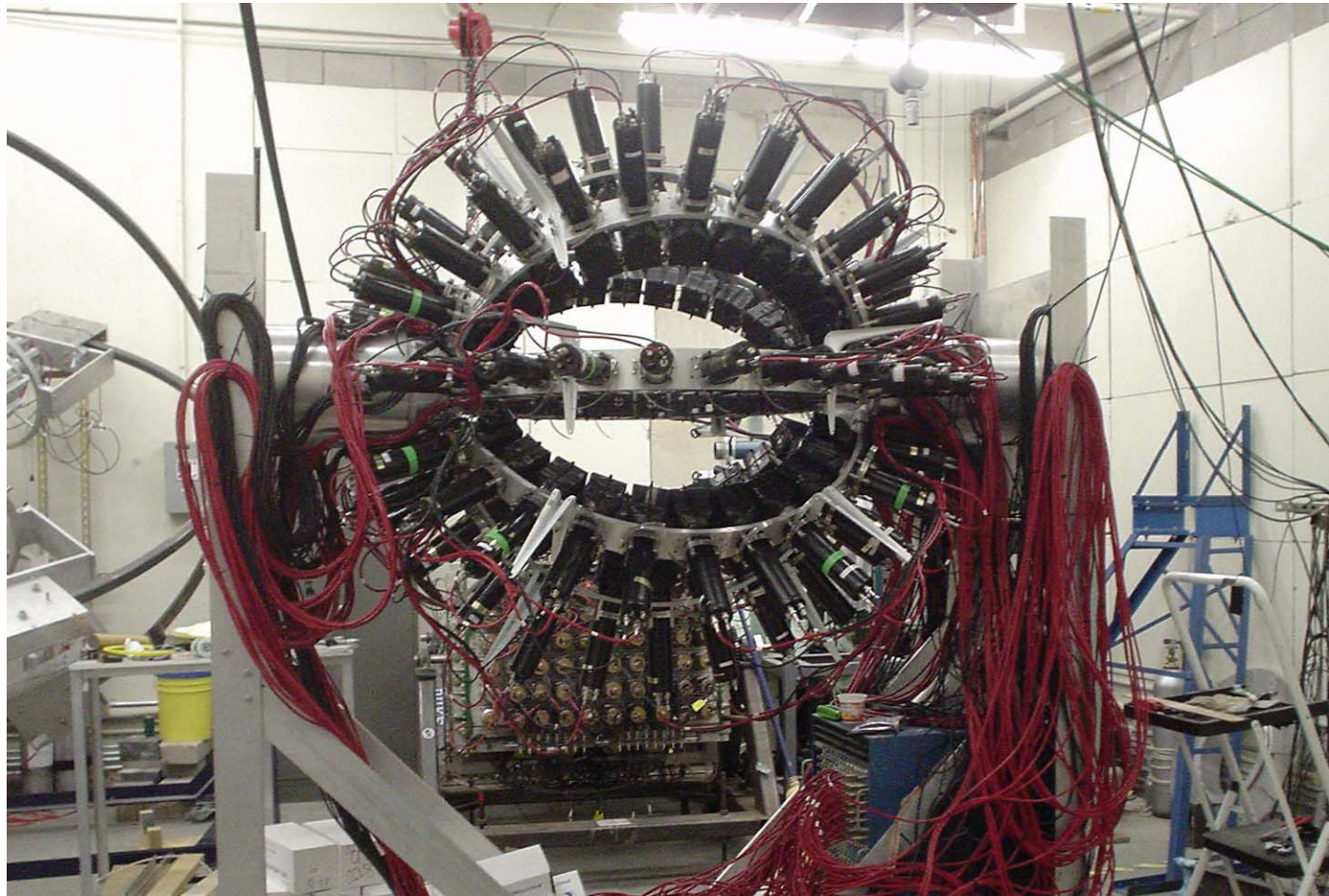
One Example: **Blowfish at HI $\gamma$ S**

- Photodisintegration of Deuterium (nucleus of heavy hydrogen)





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# Particle Astrophysics and Cosmology

Rainer Dick

- The problems of Dark Matter and Dark Energy
- The problem of Ultra-High energy Cosmic Rays
- Extensions and Modifications of Einstein's general Theory of Relativity



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# Particle Physics Theory and Phenomenology

Tom Steele

- Gauge theories and their applications to particle physics
- Quantum Chromodynamics (QCD) – the theory of the strong interactions
- Radiative breaking of electroweak symmetry



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# Quantum Entanglement

Rangacharyulu

Experimental work to Study:

- **The interpretation of fundamental results of Quantum Mechanics.**
  - Applications to:
    - Quantum computing
    - Quantum cryptography





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# Accelerator Physics

Dallin, CLS Staff

## Particle Accelerator Design

- **Beam Optics**
- **RF systems**
- **Vacuum systems**
- **Beam Diagnostics**
- **Magnet Design**
- **Cryogenics**



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# Health Physics

Benmerrouche, Sidhu, Kendell, Cancer Clinic and CLS Staff

## Diagnostic and Treatment

- **Radiation protection**
- **Medical Imaging**
- **Radiotherapy**