Argonne NATIONAL LABORATORY

Points of Discussion: ATLAS in 2006 and Beyond

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Mission of ATLAS

Mission:

The mission for the ATLAS facility at Argonne is to enable research of the highest quality by its users and staff, especially probing the properties of atomic nuclei, through utilizing the capabilities of the accelerator and research equipment in a safe and efficient manner, with the associated responsibility of research and development in accelerator science and in the techniques that are required to accomplish its scientific goals.

Strategic Plan: Science Vision

The major scientific goals of the ATLAS research program are:

(a) understanding of the stability and structure of nuclei as many-body systems built of protons and neutrons bound by the strong force,

(b) exploring the origin of the chemical elements and their role in shaping the reactions that occur in the cataclysmic events of the cosmos,

(c) understanding of the dynamics governing interactions between nuclei at energies in the vicinity of the Coulomb barrier,

(d) testing with high accuracy the fundamental symmetries of nature by taking advantage of nuclei with specific properties.

These goals are in line with the NSAC LRP & the 2004 Office of Science Strategic Plan & Milestones.

This plan takes into account the capabilities available at HRIBF & NSCL

Strategic Plan: Science Vision translated in Research Topics

- develop beams of short-lived isotopes for astrophysics, nuclear structure & reaction studies;
- characterize nuclei at the limits of stability, i.e.; at and beyond the proton drip-line, neutron-rich, and with Z > 100;
- explore the nature of nuclear excitations with mass, proton or neutron excess, spin and temperature;
- measure masses with high precision for astrophysics & searches of “new physics”;
- continue smaller scale, complementary efforts that exploit the exceptional and often unique capabilities of ATLAS (AMS, atomic physics, irradiations,..).

Implementation of Strategic Plan: Goals and Status

1. Effective operation of the ATLAS facility at 7 days/week, 5500 – 6000 hours/year ← currently 5.3 days/week
2. The development of new accelerator capabilities targeted towards these scientific goals:
   - Energy upgrade of ATLAS ← on-going
   - Improvement of in-flight radioactive beams capabilities ← *
   - Major upgrade of the reaccelerated radioactive beam capability
     → "Cf source upgrade" ← son-going
3. Effective support for experimental installation and operation:
   - **Continued scientific and technical support for the user program** ← *
   - **Continued development of the target production capability** ← * & future
   - **Upgrade of data acquisition** ← *
   - **Continued operation & upgrade of Gammasphere** ← *
   - **Experimental support for radioactive beam development** ← proposed
4. Continued operation and development of experimental capabilities**:**
   - Complete the Advanced Penning Trap ← done
   - The construction of the X-array ← on-going, much progress
   - The development of the superconducting solenoid ← proposed

*: on-going, stretched for funds & manpower

This plan takes into account the capabilities available at HRIBF & NSCL

Strategic Plan: Priorities

- *Secure reliable 5.3 days / week ATLAS operations with appropriate staffing & M&S funding (Operations and Exp. Systems)*
- *Cf upgrade*
- *Solenoid for transfer reactions in inverse kinematics*
- *Return to 7 days / week operations*
- *Make long-term 7 days / week operations and exp. support sustainable*

Request following the 2005 ATLAS S&T Review

"to articulate priorities, scientific justification for new initiatives, and the correlation of scientific campaigns with scientific goals, in the context of long-term plans".

→The ATLAS Users' Executive Committee and ATLAS management prepared questions for discussion during this workshop

Questions for Discussion:

- What are the most important physics questions that **you** plan to study at ATLAS over the next five years?
- How do these questions relate to the ATLAS Strategic Plan?
- How do these questions relate to the national priorities as expressed in
  - the 2002 NSAC Long Range Plan and,
  - the DOE-OMB performance measures ?
- What developments in accelerator capabilities and instrumentation do you envision as being needed to optimize your research program at the facility? Consider options included in the current strategic plan and new possibilities.
- Did you identify other important issues that the Executive Committee of the ATLAS User Group and the ATLAS management should make a priority for the facility?

Impact of Discussions:

- The discussion leaders will prepare a summary of the discussions within the working group (due 4/15 at the latest).

- The summaries will form the basis for the ATLAS response to the 2005 S&T review that will be sent to DOE in May 2006. This response will then be discussed at the 2006 S&T review (June 2006).

- Note also that the Nuclear Physics Community is embarking on a new Long Range Plan Exercise. Our discussions can/should be input to the vision of the low-energy community for its future.