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ATLAS Call for Proposals

Proposal submission deadline: Monday May 6, 2024

Dear ATLAS Users,

This is a call for proposals for experiments at ATLAS, for the scheduling period beginning in the fall of 2024. The deadline for proposal submission is Monday May 6 2024 and the ATLAS Program Advisory Committee (PAC) meeting will be held June 5-6 2024.

Please note that this is **a call for proposals for all experiments using stable beams, radioactive beams produced by the in-flight facility RAISOR, low-energy and reaccelerated radioactive beams from the nuCARIBU source, and some long-lived radioactive beams such as ^{14}C, ^{85}Kr, and ^{223}Ra.**

GRETINA is returning to ATLAS in August 2024 and will be available for experiments during this PAC cycle in stand-alone mode, coupled to the FMA, or coupled to auxiliary detectors. Gammasphere will be available in the fall of 2024 for experiments in stand-alone mode, coupled to the AGFA gas-filled spectrometer, or coupled to auxiliary detectors. **In January 2025, Gammasphere will move to experimental area 1 to receive directly the low-energy mass separated neutron-rich beams from nuCARIBU for an extended beta-delayed spectroscopy campaign on fission fragments. This PAC cycle will cover this campaign.** A short summary of key ATLAS instrumentation and detector stations as well as point of contact information is given below in sections D and E.

The following sections provide guidelines for the information that should be present in the proposals, the submission process, and additional background information on the beams and equipment available. The sections are organized along the following topics

A. Reminder on scheduling of Priority II experiments
B. Format of Proposals and Proposal Submission
C. Guidance for proposals requesting radioactive beams (RAISOR, nuCARIBU)
D. ATLAS Facility Background Information
E. Basic Instrumentation Information and Points of Contact
F. Program Advisory Committee

A. Reminder on scheduling of Priority II experiments

Some of the experiments that received "Priority II" approval in the May 2023 PAC could not be scheduled in the period since that meeting because of the heavy pressure for beam time when the facility is operational. For those cases, the Priority II approval remains valid for the 2024 PAC cycle (no re-submission required). However, Priority II experiments with approval letters received prior to the 2023 PAC meeting will need to be resubmitted (if you still wish to pursue beam time). Details regarding the duration of beam time approval can be found in the approval letters that are sent to the principal investigators soon after a PAC meeting ends.

B. Format of Proposals and Proposal Submission

Please remember that, at the request of the PAC, some specific requirements for proposals have been implemented (see below). Please take them into account while preparing your submissions.

The proposals to the PAC must be submitted electronically. The instructions for filling out the web-based form can be found at https://www.anl.gov/atlas/proposals.

To request beam time, **two actions are required on your** part: a) complete the ATLAS proposal web-based form, and b) email your proposal to atlas-proposals@anl.gov as an attachment. The attached file type should be either Portable Document Format (.pdf), Postscript format (.ps), or Microsoft Word.

Contents of the Form: The ATLAS Proposal Form needs to be completed for a successful submission of a proposal. A link to access the web-based form can be found inside the ATLAS proposal website at https://www.anl.gov/atlas/proposals. To assist you with the preparation of your answers for the proposals form, a worksheet (pdf file) will be made available in our proposals web site. Please note that the worksheets will not be accepted as a replacement of the web-based form. On the proposal web-based form, **please list the maximum beam energy and current you require**. This essential information is needed for radiation safety calculations. Also, beam tuning will be based on these upper limits. An increase in energy above the stated maximum or a change in beam species requires prior notice. In addition, following guidance from the U.S. Department of Energy, we will continue collecting demographic information of the gender and career status of the principal investigator (PI) for each submitted proposal. If needed, this information will only be presented during the PAC meeting as aggregates (i.e. no information of a single PI will be shared). Finally, by clicking the "submit" button in the web-based form, **you are certifying that all collaborators listed on your proposal are fully aware of the proposal and have agreed to participate in the experiment**.

Contents of Proposals: The proposals should be self-contained; including a **list of participants,** an **abstract**, the **basic physics goals** of the experiment, a **discussion of what exactly will be done** in the measurement, and any pertinent **references**. Sufficient technical details of the

proposed measurement and count-rate estimates should be included for the PAC to be able to judge feasibility and the scope of the measurement, and impact on available ATLAS resources in terms of workforce and hardware. **The PAC requests that the proposals be kept to a reasonable length, 5 pages of text maximum plus figures and appendices. It is to be presented in single-column format (i.e., a full Phys Rev C length article in two-column format is not acceptable), with fonts no smaller than those in this letter (12 pt).**

In your proposal, please summarize the results of previous experiments by the group and indicate the status of the data analysis and publication. This information will be taken into account during the PAC assessments.

Please indicate also whether the proposal is part of a PhD thesis project. A question to this effect has been added to the proposal fact sheet.

The online proposal form includes an optional section on Workforce Development/Diversity, Equity, and Inclusion (DEI) Impact. This section asks if impacts of the proposed work support workforce training, workforce diversity, equity, and development of an inclusive community. Users are asked to list applicable impacts or leave section blank if there are no specific impacts in this category.

C. Guidance for proposals requesting radioactive beams (RAISOR, nuCARIBU)

Typical beams and intensities available from RAISOR and nuCARIBU are presented at https://www.anl.gov/atlas/available-beams.

For the in-flight beams from the RAISOR facility, any secondary beam – with its specified rate, energy and purity – listed in the table https://www.anl.gov/atlas/inflight-radioactive-beams may be considered as readily available. Experiments requesting RAISOR beams not listed in the table should be discussed with the RAISOR contact (C. R. Hoffman - crhoffman@anl.gov) before submission to determine the level of beam development required. In addition, experiments requesting RAISOR beams not listed in the table will be treated as letters of intent requesting the development of these beams. User planning on bringing their own detectors and using RAISOR should contact D. Santiago-Gonzalez (dsg@anl.gov) during the preparation of their proposal to make sure their proposed experiment is feasible with the available beam lines.

This PAC cycle will offer the nuCARIBU beams obtained from neutron-induced fission of ^{235}U (the ^{252}Cf source used for CARIBU is now too weak and beams from ^{252}Cf fission are not available for this PAC cycle). The nuCARIBU system will operate at 10% of design power while operational experience and data on activation and maintenance needs are obtained. The radioactive beam intensity yields for operation with nuCARIBU (at 10% of design power) are available on the website listed above. More neutron-rich isotopes, not listed in the posted table for nuCARIBU beams, are also available at lower intensity for low-energy experiments; users planning experiments with these more difficult beams should contact G. Savard (savard@anl.gov) or D. Santiago-Gonzalez (dsg@anl.gov) for additional information. The reaccelerated nuCARIBU beams are provided through the EBIS charge-state breeder which removes the significant stable beam contamination that was generated in the previously used ECR charge-state breeder. Experiments no longer have to consider such contamination in their proposal; however, radioactive isobar contamination should still be considered in the proposals.

Low-energy nuCARIBU beams will be delivered to the new low-background experimental area 1 for decay spectroscopy either directly at the intensity given in the table, or through the MRTOF which makes the beam essentially pure but at the cost of a factor of 3 to 5 in intensity.

D. ATLAS Facility Background Information

***Stable Beams*:** The beams that are routinely available from ATLAS are presented on the ATLAS web page at https://www.anl.gov/atlas/stable-beams. In general, ATLAS can produce stable beams of heavy ions ranging from ^{7}Li to ^{238}U; lighter beams are also available upon request. For more information on the available stable beams, please contact the user liaison physicist Daniel Santiago-Gonzalez (dsg@anl.gov).

Maximum Beam Energy: ATLAS can accelerate heavy ions to roughly 10 MeV/nucleon. Higher energies might be achievable, especially for the light nuclides (A<30), while heavier nuclides may only be available at energies of 10 MeV/nucleon or less. These higher energies can now be reached with lower charge states and hence higher intensity with the refurbished G-tank cryostat back in operation.

Beam Isotope: The beam currents for elements listed in the table of available beams were obtained using natural material. Other isotopes are available with currents generally proportional to their abundance. Any special preparation that may be needed should be discussed with the ATLAS Operations Group prior to submission of the proposal. The practicality of a beam may be a consideration in the approval of a proposal.

Radioactive Beams: The radioactive beams produced by the in-flight technique are listed on the ATLAS web page at https://www.anl.gov/atlas/inflight-radioactive-beams. The contact person for additional information is Calem R. Hoffman (crhoffman@anl.gov). For low-energy and reaccelerated nuCARIBU beams, a yield table for the beam intensities to be used for experiment planning (no MRTOF) is posted at https://www.anl.gov/atlas/caribu-beams. The contact persons for additional information are Daniel Santiago-Gonzalez (dsg@anl.gov) or Guy Savard (savard@anl.gov).

***Experimental Equipment*:** General information on experimental equipment can be found in the ATLAS Instrumentation page (https://www.anl.gov/atlas/instrumentation). Other equipment is also available for potential Users, and there are general-purpose beam lines for additional scattering chambers or other non-standard equipment. For the current status of a specific experimental station, please contact any one of the Laboratory staff members or Daniel Santiago-Gonzalez (dsg@anl.gov).

***Access to the target stations while beam is present*:** The ATLAS Radiation Interlock System (ARIS) is designed so that for low-level radiation, where appropriate conditions are satisfied, access to the experimental areas is possible during the course of a measurement.

To know more about ATLAS capabilities, or to get more information on the beam energy, intensity, isotope composition, or on the radiation interlock system, please contact our user liaison physicist, Daniel Santiago-Gonzalez (dsg@anl.gov).

E. Basic Instrumentation Information and Points of Contact

***AGFA*:** The **AGFA** gas-filled spectrometer is installed on the APEX beamline and is available to operate in conjunction with **Gammasphere** or in stand-alone mode. AGFA details are at https://www.anl.gov/phy/argonne-gasfilled-analyzer or by contacting Darek Seweryniak (seweryniak@anl.gov).

CHICO-X* and *GODDESS: Large community instruments such as **CHICO-X** and **GODDESS** will be used in extensive campaigns with **GRETINA** during this PAC cycle. Groups interested in performing experiments using these devices should contact, as quickly as possible, the points-of-contact of the collaborations responsible for these devices: Steve Pain (painsd@ornl.gov) for **GODDESS** and Ching-Yen Wu (wu24@llnl.gov) for **CHICO-X**.

***FMA*:** The Fragment Mass Analyzer (FMA) is a recoil mass separator that separates products of nuclear reactions from unreacted beams and disperses them according to their mass-to-charge state ratio. There are a number of options for its utilization, either in stand-alone mode or with GRETINA that will reside at its target location during this PAC cycle. Details concerning the FMA can be found at https://www.anl.gov/phy/fragment-mass-analyzer or by contacting Darek Seweryniak (seweryniak@anl.gov).

***Gammasphere*:** Gammasphere is one of the world's most powerful spectrometers for nuclear structure research and is especially suited to collecting gamma-ray data following the fusion of heavy ions. Gammasphere is a complex instruments that may be used combined with AGFA or separately in experiments. There are a number of options for its utilization. Details concerning Gammasphere can be found at the following web-site: https://www.anl.gov/phy/gammasphere or by directly contacting Mike Carpenter (carpenter@anl.gov), or Marco Siciliano (msiciliano@anl.gov). Gammasphere, coupled to the HEART beta detector array and tape station, will be available for beta-delayed gamma-ray spectroscopy on neutron-rich isotopes in experimental area 1 starting in early 2025.

***GRETINA*:** GRETINA will be operational at ATLAS starting in August 2024 and be available for experiments during this PAC cycle in stand-alone mode, coupled to the FMA, or coupled to auxiliary detectors. For details concerning experiments using GRETINA, please contact Marco Siciliano (msiciliano@anl.gov).

HELIOS: The Helical Orbit Spectrometer (HELIOS) is a charged-particle spectrometer designed to study reactions with heavy ion beams. HELIOS is ideally suited to the study of single- and multi-nucleon transfer reactions in the inverse kinematics regime. Proposals for using HELIOS in silicon-array mode, Active-Target Time Projection Chamber mode, or with the Los Alamos Apollo array will be considered in this period. It is anticipated that tritium targets will be available. Scientists interested in using the device are requested to contact the representative of the collaboration, Ben Kay (kay@anl.gov), to discuss the feasibility of a measurement.

iCAPS: iCAPS is a compact plunger device, which can be used with GRETINA or Gammasphere. It can be coupled to Microball where the 90-degree detector ring is removed. For details, please contact Claus Müller-Gatermann (cmuellergatermann@anl.gov).

MUSIC and the Enge Split-Pole Spectrograph (SPS3): The MUlti-Sampling Ionization Chamber (MUSIC) is an active target system typically used to measure fusion cross sections or reactions of interest in Nuclear Astrophysics. Users interested in using the MUSIC detector or the SPS3 should contact Melina Avila (mavila@anl.gov) to discuss the feasibility of their experiment.

N=126 factory**: N=126 factory** is starting operation, focusing first on isotopes in the vicinity of the N=126 line. The initial program will concentrate on mass measurements but a decay spectroscopy station is being added behind a shielding wall in the adjacent room. Users interested in the radioactive beams in the N=126 region, or in the development of other beams that can be obtained with the N=126 facility, should contact Guy Savard (savard@anl.gov).

F. Program Advisory Committee

PAC membership. The present PAC membership is: Mitch Allmond (Oak Ridge National Laboratory), Kelly Chipps (Oak Ridge National Laboratory), Roderick Clark (Lawrence Berkeley National Laboratory), Aaron Couture (Los Alamos National Laboratory), Alejandro Garcia (University of Washington), Faïrouz Hammache (Laboratoire de Physique des 2 Infinis Irene Juliot-Curie), Rituparna Kanungo (Saint Mary's University), Alison Laird (University of York), Sean Liddick (Facility for Rare Isotope Beam), Darek Seweryniak (Argonne National Laboratory), Alexander Volya (Florida State University) and Kay Kolos (Lawrence Livermore National Laboratory) as Chair of the ATLAS Users Group.

Please feel free to contact Daniel Santiago-Gonzalez (dsg@anl.gov) with any questions regarding this call for proposals. Web-based submissions must be received before **May 6, 2024 23:59 US Central Time**.

Confirmation of the reception of your proposal should reach you via email by May 8, 2024. We are looking forward to exciting proposals for research at ATLAS.

Sincerely,

Guy Savard
ATLAS Director