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ATLAS Call for Proposals

Proposal submission deadline: Tuesday April 11, 2023

Dear ATLAS Users,

This is a call for proposals for experiments at ATLAS, for the scheduling period beginning in the summer of 2023. The deadline for proposal submission is Tuesday April 11 2023 and the ATLAS Program Advisory Committee (PAC) meeting will be held May 22-23 2023.

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 early 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 for experiments in stand-alone mode, coupled to the AGFA gas-filled spectrometer, or coupled to auxiliary detectors. 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 could not be scheduled in the period since the last PAC meeting because of the heavy pressure for beam time when the facility is

operational. This approval does carry over one more PAC cycle. Such proposals will, however, have to be resubmitted for consideration by a future PAC if they have not yet been scheduled and beam time is still desired.

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 (I) Portable Document Format (.pdf), (II) Postscript format (.ps), or (III) 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 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 fact sheet includes a new 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, the secondary beams have been classified in the table as "available" or "expected" with the "available" beams having already been developed (or similar enough to beams that have been developed so that yield and purity can be accurately predicted) and the "expected" beams having more uncertainty. Experiments requesting "available" beams can be approved as Priority I. Experiments requesting "expected" beams should include a two-day development period and can be approved as Priority II. The two-day development period will be run first if the beamtime is approved to confirm yield and purity. The actual experiment will only be scheduled after the beam production is successfully demonstrated. Experiments requesting RAISOR beams not listed in the table will be treated as letters of intent requesting the development of these beams. These should preferably be discussed with the RAISOR experts before submission. Lastly, a comment on radioactive beam purity. While RAISOR beams can be sent to the target areas III and IV, the radioactive ion beam (RIB) sweeper is only available for the beam lines going to HELIOS and MUSIC (in Area III), and any of the beam lines in Area IV. Without the RIB sweeper, the purity of the RAISOR beam will be roughly 10% or less. User planning on bringing their own detectors and using RAISOR should contact C. Hoffman (crhoffman@anl.gov) or D. Santiago-Gonzalez (dsg@anl.gov) 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 repeated efforts at securing a new ^{252}Cf source over the last few years have yielded no usable source. 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 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 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; proton, deuterium and ^{4}He beam 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. Again, for more information contact Daniel Santiago-Gonzalez (dsg@anl.gov).

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 persons for additional information are Calem Hoffman (crhoffman@anl.gov) or Clay Dickerson (cdickerson@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. For more information on ARIS please contact 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).

***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).

***GRETINA*:** GRETINA will be hosted by ATLAS starting in early 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. 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.

***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 part of 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).

CHICO-2* and *GODDESS: Large community instruments such as **CHICO-2** 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-2**.

MUSIC and the Enge Split-Pole Spectrgraph (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 will soon follow. 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: Kelly Chipps (Oak Ridge National Laboratory), Roderick Clark (Lawrence Berkeley National Laboratory), Aaron Couture (Los Alamos National Laboratory), Alejandro Garcia (University of Washington), 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 **April 11, 2023 23:59 US Central Time**.

Confirmation of the reception of your proposal should reach you via email by April 13, 2023. We are looking forward to exciting proposals for research at ATLAS.

Sincerely,

Guy Savard
ATLAS Director