Focus on Exotic Beams at ISOLDE: A Laboratory Portrait

To cite this article: María J G Borge and Klaus Blaum 2018 J. Phys. G: Nucl. Part. Phys. 45 010301

View the article online for updates and enhancements.

Related content
- Physics with post-accelerated beams at ISOLDE: nuclear reactions
  A Di Pietro, K Riisager and P Van Duppen
- ISOLDE past, present and future
  María J G Borge and Björn Jonson
- The HIE-ISOLDE Project
  Alexander Herlert and Yacine Kadi
Fifty years after the delivery of the first radioactive ion beam on 16 October 1967, the on-line isotope separator ISOLDE, representing the longest active experiment at CERN, has not reduced but strengthened its power and glory. By bombarding a thick target with high-energy proton beams of up to 1.4 GeV from the CERN booster accelerator, a wide variety of more than 1000 radionuclides can be produced, ionized with efficient ionization techniques, mass separated and delivered to different experimental setups installed at the ISOLDE beamlines. Continuous extensions and upgrades of the ISOLDE facility were essential to maintain research at the forefront in the fields of nuclear structure physics, nuclear astrophysics, and solid state physics and life science with radioactive probes.

ISOLDE is well known for its pioneering role in developing new intense radioactive ion beams of superb quality. These beams get delivered either in continuous or bunched mode to a wide variety of devices; some of them permanently installed, others being traveling setups. To the former belong the low-energy atomic physics experiments like Penning-trap mass spectrometry at ISOLTRAP or high-resolution laser spectroscopy at COLLAPS and CRIS used to study nuclear ground and isomeric properties like masses, radii, and moments. To the latter belong nuclear spectroscopy and decay studies, for example those performed at the ISOLDE Decay Station, where one gains information on nuclear structure and fundamental interactions. Applied physics using radioactive probes is performed at the solid state physics beamline. Experiments with post-accelerated radioactive ion beams started on 31 October 2001, when the first beams of 2.2 MeV/u were delivered by the REX-ISOLDE accelerator. To date, with two major upgrades within the HIE-ISOLDE project, post-accelerated beams up to 5.5 MeV/u were available for nuclear reaction studies in 2016. Energies up to 7.5 MeV/u...
are available in 2017 and 10 MeV/\mu in 2018, and with that the highest energies planned for post-accelerated beams will be achieved.

Currently there is a strong world-wide effort to build new high-intensity radioactive ion beam facilities, among others FAIR at Darmstadt (Germany), SPES at Legnaro (Italy), SPIRAL2 at GANIL (France), ARIEL at TRIUMF (Canada), FRIB at East Lansing (USA), demonstrating the strong needs of the community for this type of research. This special issue entitled ‘Focus on Exotic Beams at ISOLDE: A Laboratory Portrait’ shall serve as a reference, demonstrating the wide breadth of research with radioactive ion beams.

The invited contributions in this issue present the recent highlights obtained with the different experimental setups at ISOLDE. In total this issue comprises 17 invited papers, 2 theoretical contributions and 10 individual publications with recent results obtained in experiments performed at ISOLDE. This focus issue builds on the one published in the year 2000 (Hyperfine Interact. 2000 129 1–553).

The outstanding output of the ISOLDE facility is due to the contribution of more than 800 users, some of whom participated in the 2016 edition of the annual ISOLDE Workshop and Users Meeting (see first photo below). The second photo was taken on 17 December 2014 during the ISOLDE Workshop and Users meeting where we celebrated the golden jubilee of the approval of ISOLDE that occurred 50 years before on 17 December 1964. The photo shows the ISOLDE technical (ITC) and physics coordinators (IC) and group leaders (IL) since 1978. Before 1978 Arve Kjelberg (1928–2016) and Hansen (1933–2005) lead the facility from 1966–1971 and 1971–1978, respectively.
Thanks to the technical advances and the dynamic and enthusiastic technical team and user community we forecast a bright future for ISOLDE.

Maria Borge
Klaus Blaum
CERN, February 2017