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An innovative Superconducting Recoil Separator for HIE-ISOLDE

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I. Martel¹, L. Acosta², J.L. Aguado¹, M. Assie³, M. A. M. Al-Aqeel^{4,25}, A. Ballarino⁹, D. Barna⁵, R. Berjillos⁶, M. Bonora⁹, C. Bontoiu⁴, M.J.G. Borge⁷, J.A. Briz⁷, I. Bustinduy⁸, L. Bottura⁹, L. Catalina-Medina⁸, W. Catford¹⁰, J. Cederkäll¹¹, T. Davinson¹², G. De Angelis¹³, A. Devred⁹, C. Díaz-Martín¹, T. Ekelöf¹⁴, H. Felice⁹, H. Fynbo¹⁵, A.P. Foussat⁹, R. Florin²⁶, S. J. Freeman^{9,27}, L. Gaffney⁴, C. García-Ramos¹, L. Gentini⁹, C. A. Gonzalez-Cordero¹, C. Guazzoni²⁹, A. Haziot⁹, A. Heinzl⁶, J.M. Jimenez⁹, K. Johnston⁹, B. Jonson¹⁶, T. Junquera¹⁷, G. Kirby⁹, O. Kirby³⁰, T. Kurtukian-Nieto¹⁸, M. Labiche²², M. Liebsch⁹, M. Losasso⁹, A. Laird¹⁹, J.L. Muñoz⁸, B.S. Nara Singh²⁰, G. Neyens⁹, P.J. Napiorkowski²⁸, D. O'Donnell²⁰, R. D. Page⁴, D. Perini⁹, J. Restalópez²¹, G. Riddone⁹, J.A. Rodriguez⁹, V. Rodin^{4,22}, S. Russenschuck⁹, V.R. Sharma², J. Sánchez-Segovia¹, K. Riisager¹⁵, A.M. Sánchez-Benítez¹, B. Shepherd²², E. Siesling⁹, J. Smallcombe⁴, M. Stanoiu²⁶, O. Tengblad⁷, J.P. Thermeau²³, D. Tommasini⁹, J. Uusitalo²⁴, S. Varnasseri⁹, C.P. Welsch⁴, G. Willering⁹.

¹CCTH, Univ. Huelva, Spain. ²Inst. de Física, UNAM, Mexico. ³Univ. Paris-Saclay, CNRS/IN2P3, IJCLab, Orsay, France. ⁴Dept. of Physics, Univ. Liverpool, UK. ⁵Wigner Research Centre for Physics, Budapest, Hungary. ⁶TTI Norte, Santander, Spain. ⁷IEM, CSIC, Madrid, Spain. ⁸ESS-BILBAO, Bilbao, Spain. ⁹CERN, Geneva, Switzerland. ¹⁰Dept. of Physics, Univ. Surrey, UK. ¹¹Dept. of Physics, Lund Univ., Sweden. ¹²Univ. Edinburgh, UK. ¹³LNL INFN, Italy. ¹⁴Uppsala Univ., Sweden. ¹⁵Dept. of Physics and Astronomy, Aarhus Univ., Denmark. ¹⁶Dept. of Physics, Chalmers Univ. of Technology, Göteborg, Sweden. ¹⁷ACS, Orsay, France. ¹⁸Univ. Bordeaux, CNRS, Gradignan, France. ¹⁹Dept. of Physics, Univ. York, UK. ²⁰School of Computing, Engineering & Physical Sciences, Univ. of West Scotland, UK. ²¹ICMUV, Univ. de Valencia, Spain. ²²Cockcroft Institute, Daresbury, UK. ²³Universite de Paris, CNRS, Astroparticule et Cosmologie, France. ²⁴Faculty of Mathematics and Science, Univ. Jyväskylä, Finland. ²⁵IMIS Univ. Riyadh, Saudi Arabia. ²⁶IFIN-HH, Bucharest, Romania. ²⁷Department of Physics & Astronomy, Univ. Manchester, UK. ²⁸HIL, University of Warsaw, Poland. ²⁹Dept. Electronics, Info. and Bio., Politecnico di Milano, Milan, Italy. ³⁰Paul Scherrer Institute, Zurich, Switzerland.

Abstract

The development of radioactive beam facilities has unprecedentedly expanded our capacity to investigate the structure of the atomic nucleus and the nuclear interaction. The ISOLDE Scientific Infrastructure at CERN offers the widest range of low-energy radioactive beams [1]. The scientific program can be remarkably improved with the installation of an innovative spectrometer, the “Isolde Superconducting Recoil Separator” (ISRS), that will give very high mass resolutions and access to regions of the nuclear chart presently unknown [2]. The ISRS spectrometer is based on an innovative concept for particle storage, the Fixed Field Alternating Gradient Superconducting Mini-Ring (FFAG-SCMR), an array of iron-free superconducting multifunction Canted Cosine Theta magnets [3] cooled by cryocoolers, integrated into a compact storage mini-ring using Fixed Field Alternating Gradient focussing [4]. The present goal of the ISRS collaboration is to perform the necessary research to demonstrate the feasibility of building FFAG-SCMRs and their application to particle spectroscopy. A prototype of a multifunction iron-free SC magnet will be built (MAGDEM) and probed with heavy-ion beams to prove the working concept. In this contribution, an overview of the physics goals and ongoing technical developments will be presented and discussed.

References

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Primary author: MARTEL, Ismael (University of Huelva)

Presenter: MARTEL, Ismael (University of Huelva)

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