JYFL Accelerator News

Accelerator Laboratory, Department of Physics
University of Jyväskylä, Finland

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Next Call for Proposals
Deadline: September 15, 2018

The trials of a nuclear physicist

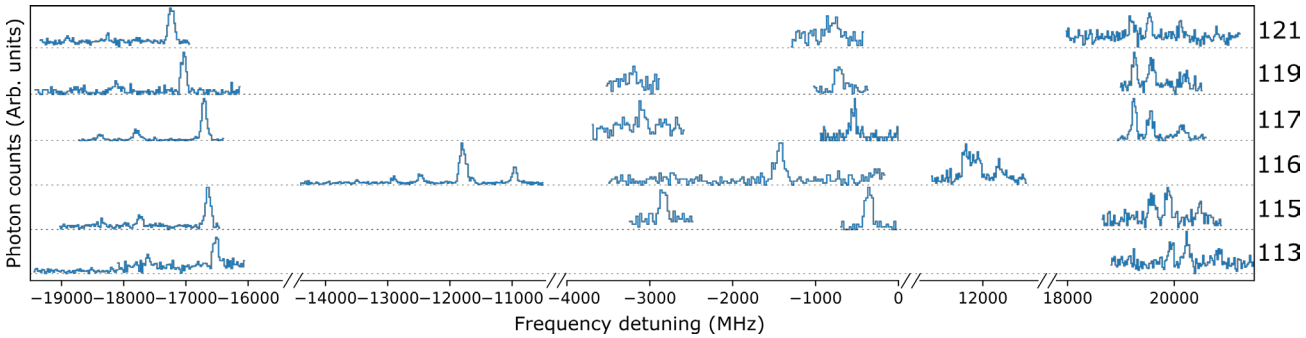
After a career spanning over 45 years at the Department of Physics, our eminent Professor Rauno Julin delivered his farewell lecture "The Trials of a Nuclear Physicist" on the 8th June after officially retiring on 31st December 2017. Rauno's achievements are too numerous to be listed in a short piece such as this, but he will be clearly remembered for the incredible influence he has had in leading the activities of the Accelerator Laboratory and cementing its position as one of the leading nuclear physics laboratories in the world. He has been a guiding light and shining example to a huge number of scientists, both at home and abroad. In the photograph Rauno can be seen receiving the congratulations of the Dean of the Faculty, Vice-Rector and Rector of the University. His colleagues from the Nuclear Spectroscopy Team presented him with a smoke machine to go alongside the disco ball in his home studio, which was much appreciated by Rauno's band members!

Finnish Academy project success for JYFL-ACCLAB researchers Iain Moore and Hannu Koivisto

Nuclei with equal numbers of protons and neutrons are excellent laboratories to investigate the subtle interplay of nucleons. Indeed, in the region close to mass A=100, there is a large spatial overlap between the single-particle wave functions arising from the occupation of the same shell-model orbitals. With the addition or subtraction of only a few nucleons, rich structures arise from a coexistence and/or competition of different nuclear shapes, nuclei exhibit isomerism and candidates have been found for exotic modes of decay. A project aimed at studying such systems using the MARA recoil separator, stopping gas cell and laser spectroscopy, has been awarded 530000 euros from the Finnish Academy. This funding will be used to employ new manpower in order to realize the MARA Low Energy Branch and to investigate the many exciting opportunities offered in this region of the nuclear landscape.

A second Academy project, "The effect of a magnetic field structure on the performance of an ECR source", is based on an innovative ECR ion source design based on permanent magnets, whose magnetic field structure differs significantly from the corresponding structure of the standard ion source. The successful implementation of the prototype would open up new opportunities for the further development of ECR ion sources, device-based nuclear physics research and various applications.

Optical spectroscopy of atomic silver isotopes at IGISOL



Optical frequency scans on different isotopes of silver, the mass number indicated on the right. The different resonances represent hyperfine transitions of both ground and isomeric states.

Over the past months the collinear laser spectroscopy beamline in the IGISOL laboratory has been extensively upgraded. New beam diagnostics, a new data acquisition system and a charge exchange cell were introduced. These upgrades will prepare the beamline for the next generation of experiments. The addition of a charge exchange cell allows neutralization of ion beams. This enables access to many interesting isotopes which can best be probed using atomic transitions, including refractory elements that were impossible to study until now. The upgrades to the beamline, and in particular the new charge exchange cell, were commissioned with an experiment on beams of radioactive silver isotopes produced in fission. Over the course of a week, the electromagnetic moments, spins, and changes in the charge radius of ground and long-lived isomeric states of $^{113\text{-}121}$Ag were measured. These measurements represent a first phase of a larger campaign that aims to study the nuclear properties of exotic silver isotopes, and nuclear structure between Z=40 and Z=50 in general.

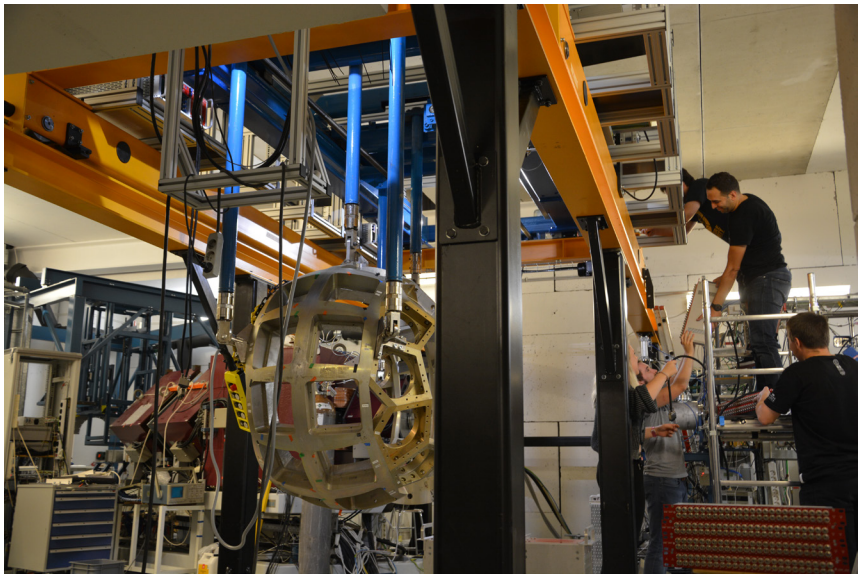
MCC30/15 cyclotron gradually coming back to operation

Several years ago, after a few successful runs, the MCC30/15 cyclotron RF-system started to cause problems. There were both mechanical and electric problems. The mechanical problems concentrated on the RF-trimmer mechanism. We tried several solutions to make the structure reliable without success until the whole trimmer arm was moved outside the RF-cavity. Some other mechanical improvements were also made. The RF-amplifier chain also caused a lot of problems, starting with the Intermediate Power Amplifiers (IPA) that broke several times. After getting new IPA's and having learned how to fix them, together with the totally new trimmer capacitor structure, the RF started to behave in a stable manner: we could keep the desired 40 kV on for a period of a few days. There are, though, still some problems of stability to be solved. In August 2018, Antonio Caruso from Catania (LNS-INFN) came for several days to Jyväskylä to help us with the studies of the RF-system. During his visit we got valuable advice how to improve the diagnostics of the RF-system and also about some improvements we should make in order to get the RF-system more reliable. There is still some work to do before we can get the MCC30/15 cyclotron in routine operation. At the present, an educated guess is a few months.

Antonio Caruso (left) and Arto Lassila (right) studying the signals from the RF-amplifier chain.

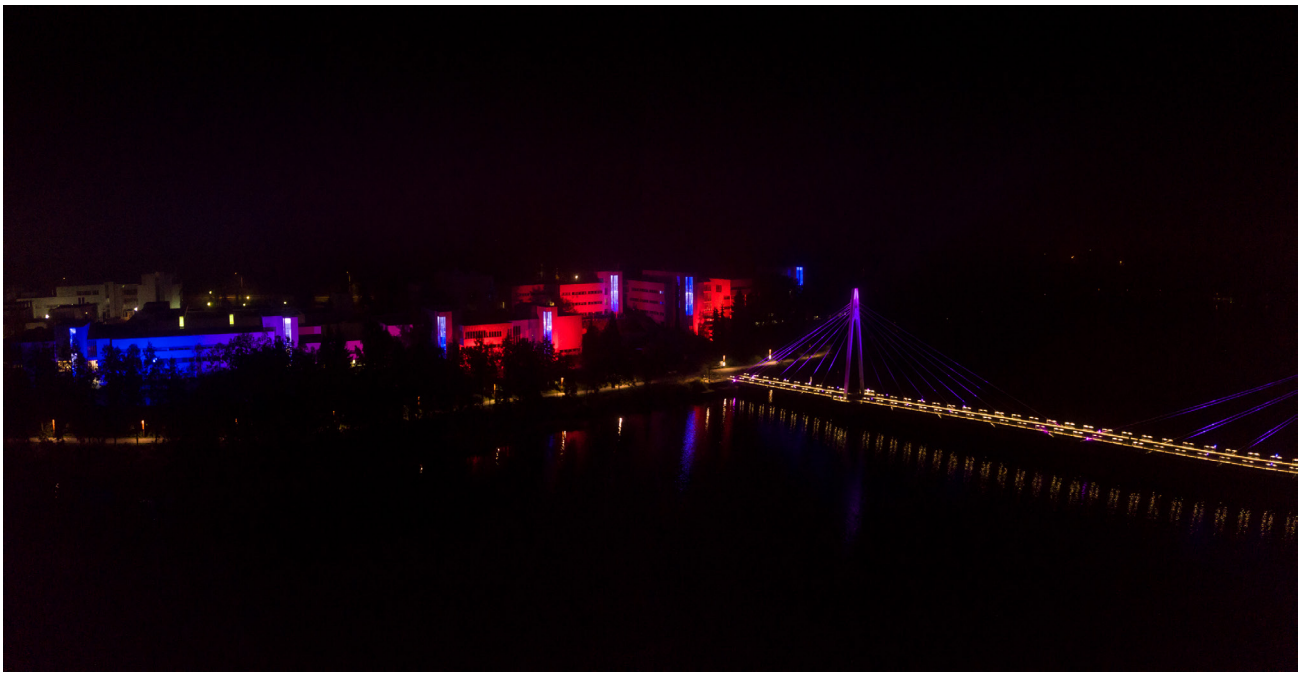
JUROGAM3 soon to be realized

The first real break in in-beam γ-ray spectroscopy experiments at JYFL in fifteen years is coming to an end. In summer 2017 the Phase1 and Clover Ge-detectors from GAMMAPOOL were shipped to experiments at HIL, Warsaw and IPNO, Orsay, respectively. The beginning of August saw the arrival of detectors back at JYFL. Meanwhile, the construction of the JUROGAM 3 transportation mechanics has made good progress. The new system will allow the array to be moved between the adjacent RITU and MARA caves while keeping the detectors biased.



Students mounting HV power supplies on the JUROGAM3 gantry.

Accelerator Laboratory opens to the public again



The JYFL Accelerator Laboratory illuminated in the previous Researchers' Night event in September 2017. Photo: Rami Saarikoski

The Finnish consortium proposal for the H2020 European Researchers' Night call has received funding. The TRACES project covers the years 2018 and 2019 and follows up the highly successful CHANGE ERN project organised in 2016 and 2017. Tutkijoiden yö, as it is called in Finnish, has become the largest science communication event in Finland. The consortium, coordinated by Janne Pakarinen, involves the majority of Finnish universities, VTT and other stakeholders. Researchers' Night will be held on Friday 28 September 2018 and welcomes people of all ages to acquaint themselves with science and scientists' work to visit e.g. the JYFL Accelerator Laboratory and other venues in 12 different cities around Finland.

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Deadline: September 15, 2018

The next deadline for submission of proposals and letters of intent is September 15, 2018. **Proposals should include an abstract/summary**. A justification of the beam time requested, based on cross-sections, detector efficiencies, etc. should be given. If a proposal is the continuation of an existing experimental program at the JYFL Accelerator Laboratory, a summary of the status of the project should be included. Proposals and letters of intent should be sent (preferably as a postscript or pdf file) to the Program Advisory Committee secretary Mikael Sandzelius (address: see below) and include the Proposal Summary Sheet which is available from the JYFL WWW-pages (https://www.jyu.fi/fysiikka/en/research/accelerator/index_html/beamtime.html). You are encouraged to contact anyone in the Contact List at the end of this Newsletter for more information.

From 1st March 2016, the JYFL Accelerator Laboratory is one of the HORIZON2020 ENSAR2-Infrastructures offering a certain amount of supported access to the users from the EU and associated countries. Requests for such support (travel and living expenses during experiments) should be attached to the scientific proposal. All publications resulting from work done at the Accelerator Laboratory should also contain the following acknowledgement:

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