



ENSAR2/MIDAS Meeting

CAEN 26-27 June, 2019

Notes (all presentations on MIDAS website)

The last (4th) annual MIDAS-meeting was held at GANIL in Caen, France, 26-27th June, 2019. The GANIL ion source team organized the meeting where 17 attendees gathered from seven partner institutes in 5 EU countries. The agenda of the meeting, all presentations and reports can be found from (<https://webapps.jyu.fi/wiki/display/ensar2/Meetings>). The first day of the meeting focused on the status of MIDAS-NA and progress reports of each partner. The second day was reserved for collaboration discussions and planning.

Participants:

H. Koivisto, V. Toivanen, JYFL, Finland
C. Barué, P. Jardin, L. Maunoury, O. Bajeat, M. Dubois, V. Maradia, GANIL, France,
T. Thuillier, LPSC, France,
M. Cavellier, Pantechnik, France,
K. Tinschert, R. Lang, J. Mäder, GSI, Germany,
Sandor Biri, Richard Rácz, ATOMKI, Hungary,
Daniel Cortazar, Ana Megia Macias, UCLM, Spain,

Welcome speech and GANIL presentation were given by the GANIL deputy leader, Héloïse Goutte.

H. Koivisto (JYFL):

Presentation of the commitments made to EU and then historical review of the work completed. All commitments have been fulfilled and, in some cases, significantly exceeded. Discussion about the last deliverable report and future collaboration.

S. Biri (ATOMKI):

By adding a middle coil (1 pancake), and then by optimization of coil axial location and plasma electrode axial location yielded a factor of two increase in beam current performance. Extraction side resonance point moved from 65 mm to 35 mm from the extraction aperture. Nice beam intensities when a low beam transport is taking into account. Furthermore, the modified middle coil opens the possibilities to study the plasma instabilities appearing at high B_{min}/B_{acr} values.

R. Racz (ATOMKI):

Theory and results of 2 close frequency heating were presented. The theory predicts that Δf should be smaller than 0.5 GHz to achieve the beneficial impact of multiple frequency heating. Plasma radio emission was detected by a spectrum analyzer through rf probe, and the recorded spectra was used to determine (a quantitative parameter) the strength of the plasma instabilities, in a consistent way. It was shown that the two close frequency heating can effectively decrease the instability parameter. X-ray pinhole camera photos were presented showing strong correlation between the plasma losses and the instability strength.



V. Toivanen (JYFL):

The status and the latest development of HIISI were presented. HIISI has met and even exceeded the requirements set for the project. Research and development work for the extraction will be started soon to deploy the full potential of HIISI. The status of high resolution JYFL spectrometer was presented. The results of ion temperature measurements by using the JYFL spectrometer were presented as well.

T. Thuillier (LPSC):

Presentation of the low temperature oven development results, specially adapted to modern ECRIS where high density plasma and high RF power is required. The oven mark II is reliable up to $\sim 700^{\circ}\text{C}$ and controls metallic ion evaporation (like Ca, Mg, etc) in the PHOENIX 3 ion source operated up to 2 KW RF at least at 18 GHz. A temperature probe included in the design helps to stabilize the oven behavior under operation. Recently, the ion source test bench was upgraded to install a 1m radius, 13 cm gap bending magnet to enhance beam transport and separation. After a long period of mismatch and misunderstanding between simulation results and experiments, the upgraded bench is now fully understood and the mass resolution has double ($M/dM > 60$) with a much better beam transmission (70 to 90%).

K. Tinschert (GSI):

Also GSI team is expanding activities to OES, goal is to use it in oven studies, perhaps online monitoring of oven/ECRIS-plasma during operation. Oven temperature is investigated with and without microwave heating. Microwave shielding of oven is investigated to reduce the effect of plasma heating on the oven temperature. The upgrade of the ECRIS facility is ongoing.

Megia (UCLM):

R&D for low temperature plasma (see the presentation)

C. Barue (GANIL):

GANIL hto (see the presentation).

L. Maunoury (GANIL):

1+/n+ (see the presentation)

M. Lewitowicz presentation was given by P. Jardin (GANIL):

Presentation of ERINS: motivation, objectives and time lines were given. Different programs (TN, JRA and NA), management and plans of ERINS were presented (see presentation)

H. Koivisto (JYFL):

Presentation of IBIS in ERINS. The objectives and total budget. Presentation of ECRIS collaboration, MIB4TNA, in IBIS: three subtasks, participants, distribution of work, milestones and deliverables.

A. Ghribi (GANIL):



Presentation of task 2 in IBIS (AMS²: Advanced Model based control of cryogenic systems for superconducting nuclear accelerator). Motivation and all subtasks of AMS² were presented. The complicated control requirements and system were highlighted.

C. Barue (GANIL):

Presentation of task 1 in MIB4TNA. This subtask focuses on technological development of solid ion beam production. Special attention will be paid on beam stability, durability and contamination issues.

H. Koivisto (JYFL):

Presentation of task 2 in MIB4TNA. The main objective of this subtask is to increase the beam intensity available for the ERINS TNA facilities. This will be done by increasing the microwave power available for the plasma heating. This will need multiport microwave injection and more efficient cooling of plasma chamber. Innovative plasma chamber structures will be tested to increase the heating efficiencies and microwave-plasma coupling. Discussion about the cooling and geometrical issues.

S. Biri (ATOMKI):

Presentation of task 3 in MIB4TNA. The main objective is to find means to suppress plasma instabilities and to study the impact of innovative plasma chamber structures on the plasma stability. Earlier work to stabilize plasma and results were presented.

General discussion:

- Midas website: it was concluded, as a result of its value, that MIDAS website will be maintained also after the completion of MIDAS-NA. The JYFL ion source group will be responsible on the management and collaboration of website. Each team will make upgrades upon their progress and new results. In each laboratory, one contact person must be clearly identified.
- Continuation of collaboration beyond MIDAS: several collaboration projects have started and will continue beyond the present EU program. Each laboratory likes to continue the collaboration and will seek different funding possibilities.
- Exchanges with industrial partners. How to reinforce their participation and on which subjects?
- Cryogenic task. Organizing constraints have led to associate ECRIS and cryogenic activities. Would it be possible to take advantage of this opportunity to improve our knowledge in the field of cryogenic techniques, by organizing courses dedicated to ECRIS needs?
- Data Management Plan: Discussion about the DMP: what it means and what it will require. We concluded that ERINS management will be contacted for further information in the case of positive funding decision.
- Organisation/preparative work for MIB4TNA: We decided that we will not invest more person months before the funding decision has been announced. The evaluation report of ERINS application should be available by September, 2019.
- Europe objectives. Would it be possible to get from physics challenges more precise orientations to follow in the field of ECRISs R&D?

