

Minutes of the DESIR meeting on March 20, 2006 in Paris

Participants: B. Blank, E. Balanzat, M.J.G. Borge, F. Le Blanc, M. Lewitowicz, D. Lunney, O. Naviliat-Cuncic, J.-C. Thomas

M. Lewitowicz: News from the SPIRAL2 management

- Project management in place
- Work packages more or less defined
 - “Accelerator” section: most of the work packages have been attributed.
 - “beam” section: there are still some packages to be attributed, e.g., the building of the beam lines
 - “Infrastructure” section: the building of the production cave as to be attributed

The list of the attributed packages should be communicated in April 2006.

- “Alternative solutions” working groups
 - the design of the low-resolution mass separator option is not yet defined. A working group is studying the possible alternatives to the first three options that were considered (“Brama”, “Wien-filter” and “Bi-selective”). The possibility to use two parallel single-channel separators is being considered. However, it means that the two target stations should be operational at day 1, which was not considered in the APD.
- The impact on the SPIRAL2 physical program of an intensity limitation after the first separation stage down to 10^{10} pps is being studied for safety and costs issues. Idea: to have the buildings after the separator as a “yellow zone”
- Official planning of SPIRAL2 in april 2006
- LoI:
 - call for LoI in may
 - evaluation by SAC in autumn 2006
 - proposals spring 2007
 - MoU on instrumentation 2007/8
- Possibility to get financing from EU via FP7
- The European Strategy Forum on Research Infrastructures (ESFRI, <http://www.cordis.lu/esfri/>) has recommended the SPIRAL2 and the FAIR projects to the FP7 European framework program. The FP7 funding program will be decided by April 2006.
- Travel expenses for foreign participants to DESIR meetings can be financed by the SPIRAL2 project. Contact: Armelle Latour, SPIRAL2 assistant (latour@ganil.fr, +33 02 31 45 45 84)

General discussion:

There is a clear need for a reinforcement of the links between the DESIR collaboration and the SPIRAL2 management structure in order to make sure that DESIR will be part of the SPIRAL2 facility.

Of particular importance is the question of the funding of the DESIR building: it is not included at the moment in the SPIRAL2 budget and it cannot be afforded by the collaboration.

The first task is to estimate the price of the building: collaborators are asked to get information about the price of “similar” 1500 m² facilities, such as AIFIRA at Bordeaux and ISOLDE at CERN. B. Blank proposes that a schematic but realistic drawing of the DESIR facility is performed by the CENBG “Bureau d’études” (responsible: F. Delalée) before summer 2006 (information after the meeting for the prize from ISOLDE and AIFIRA: 2k€/ m²)

M. Lewitowicz suggests that the DESIR building is financed within the coming “Plan Etat-Région” five years contract between GANIL and the “Région Basse Normandie”.

The funding and the construction of the High Resolution Separator (HRS) is a main concern. D. Lunney proposes that a preliminary design study is performed at the CSNSM, in addition to the one of the HRS cooler. It could be done in collaboration with European researchers involved in the EURISOL project. With respect to the construction of the HRS, M. Lewitowicz will see whether it can be done within the SPIRAL2-FAIR collaboration.

The overall cost of the DESIR facility, from the HRS cooler to the detection stations, should be roughly estimated by May 2006 (information to be sent to the SAC) and more precisely estimated by summer 2006 (information so be sent to the SPIRAL2 management).

LOI DESIR

The different contributions to the common DESIR LoI are presented. Contributors are asked to provide a first draft by the end of April. Each contribution should consist in a general introduction to the physics addressed, a description of the physics cases that could be studied at DESIR and a description of the setup they are planning to use. The required beam characteristics (purity, intensity, availability) should be mentioned.

A consolidated version of the LoI should be available by the end of May 2006. It will be sent to the physics community to enlarge the collaboration and to get some support.

M.J.G. Borge: Decay spectroscopy

- Beta decay is first probe to study a new nucleus
- Halo nuclei -> detect neutrons.... Who? R&D needed
- Polarised beams -> lasers
- GT strength distribution -> TAGS
- Other subjects: Fermi transitions, isospin mixing, pn pairing etc
- Beam requirements:
 - beam purity and good optics
 - mass separator resolution $M/\Delta M = 3000$
 - large variety of isotopes
 - stored and pulsed beams
- Setup:
 - γ detectors
 - β detectors
 - charged-particle array
 - neutron-detection array

F. Le Blanc: Laser spectroscopy: LUMIERE

- spectroscopy and laser ion source
- physics case:
 - charge radii, magnetic moments, quadrupole moments and spin of isotopic or isotonic chains, e.g. $Z=28, N=50, Z=50, N=82$, very heavy nuclei
- high resolution needed
- Methods:
 - collinear laser spectroscopy:
 - Yield: 1000-10000 pps minimum
 - Efficiency: 10^{-3} - 10^{-4}
 - precision: 10^{-3} on Δr , 10^{-2} - 10^{-3} on μ_n , 10^{-1} on Q_I
 - first measurements: Ag isotopes for $N=82$ magic number
Ge isotopes for $N=50$
 - β -NMR:
 - Purity: 50%
 - Yield: 5000 pps
 - $T_{1/2}$: 1ms – 10s
 - precision: 10^{-3} on μ_n (no sign), 10^{-2} on Q_I
 - first measurements: Cu and Ga isotopes -> g factors
 - Microwave double resonance in a Paul trap
 - Quadrupole moments, hexadecupole moments etc
 - Yield: 100 pps
 - $T_{1/2}$: 100ms
 - First measurements: Au, Rn, Fr, Ra, Am

D. Lunney: Beam handling

- Beam preparation with HRS + cooler
- Traps to prepare pure beams: Penning, Paul, MOT
- In-trap spectroscopy: e.g. for conversion electron spectroscopy or for proton detector to suppress beta background
- Reactions in plasma with EBIT

Conclusion for DESIR LoI:

- Draft of LoI should be written by end of april
- Including a first cost estimate for the hall of DESIR
- Cost estimate also for beam lines and equipment by may 2006

Short presentation of J.C. Thomas of the ANR funding request for VS3 (Versatile stand-alone spectroscopy setup)

- Collaboration of four groups: GANIL/LPC, Strasbourg, IPNO, Bordeaux/Madrid
- Parts:
 - beam diagnostics
 - tape drive system
 - beta detection setup
 - 8π charged-particle setup + DAQ
- Total funding request: 543000 euros

E. Balanzat: Non-nuclear physics with low-energy beams at SPIRAL2

E. Balanzat, from the CIRIL laboratory at Caen, gives hints about the non-nuclear physics topics that could be addressed at the DESIR facility. They are derived from the contributions of the research field to the SPIRAL2 White Book.

- No interest in accelerated beams
- Condensed matter physics:
 - impurity environment:
PAC, Mossbauer spectroscopy, channelling with conversion electrons
- Atomic diffusion
- Positron beam line: low energy positron diffraction (LEPD)
- Sources: ^{22}Na (3.5 GBq!!!)
 $^{18}\text{O}(p,n)^{18}\text{F}$
 ^{64}Cu : 100GBq
- Online: $^{12}\text{C}(d,n)^{13}\text{N}$: 10^7 e⁺/s
- SPIRAL2: ^{15}O , ^{13}N , ^{19}Ne
e.g. ^{15}O : $>10^{10}$ pps -> 10GBq
- Medicine, biology, imaging, radiotherapy etc
- The space foreseen seems to be adequate
- How much beam time could be expected for this physics???

General remarks:

- DESIR documents on EDMS
- DESIR web page once LOI is ready