HISPEC DESPEC

The PAC feels that the value of the science is indisputable and an important component of research at the future FAIR facility. The need for the measurements in this proposal is high.

For intermediate energies, HIPSPEC uses methods that are technically feasible and will benefit from the implementation of the forward fraction of AGATA. The experiments are well conceived and should produce excellent physics.

DESPEC is a natural exploitation of the rare exotic nuclei beams that emanate from FAIR. Decay spectroscopy of new nuclei is one of the key elements of exotic nucleus research. The experiments will employ highly segmented detectors to overcome the problem of gamma-flash from the degrading foil that slows the beams to 10 MeV/u, which will affect the performance in the sub-ms half life regime. It is noted that the distance to the final slowing down foil can be of the order of 10 meters which should lessen the effect of the photon shower and possibly allow standard clover detectors to be used in place of the complex highly segmented system. The design of the segmented gamma- and the high-resolution neutron-detector arrays should be pursued with high priority.

However, for low energies, there are several perceived problems in the experimental configuration as proposed. In particular, beam identification at 5 MeV/u is an area that requires considerable R&D. The beam characteristics will impact the design of any subsequent detector array and beam tracking/identification system. Despite initial simulations, there is evidently significantly more work that has to be done in this area. Further simulations and design studies depend crucially on the progress of the LEB design. Another possibility to improve the low energy beam quality is to use cooled and slowed down beams from the NESR. Studies of this possibility must take into account the fairly long slowing down times to Coulomb Barrier energies (ca. 60 s, which, though would still enable ^{68}Ni and ^{132}Sn beams). The collaboration has made the case for a large solid angle magnetic spectrometer; however, this case is too general and does not specify which physics problems it will address. The spectrometer also has to adapt to the large momentum spread of any recoil products. This proposal should have laid out a better structure for the development of the technically challenging instrumentation for slowed down beams. It is important that this R&D be pursued, but a better framework has to be found, and the collaboration should work more cohesively towards this direction. It should be noted, though, that the collaboration is very large and diverse and represents a large number of areas of particular expertise.

Overall, the HISPEC/DESPEC proposal is unique to FAIR for exotic nuclei that cannot be produced in reasonable quantities at other fragmentation facilities or for refractory elements that cannot be produced at ISOL facilities. Additionally, the high energy part of HISPEC is unique to FAIR for exotic nuclei that cannot be produced in reasonable quantities at other fragmentation facilities and for the study of double fragmentation. The present RISING program at the FRS provides an excellent R&D study ground for the key design problems of the entire proposal.

This proposal is on track for 2010 except for the low-energy part of HISPEC that needs considerable R&D, and design work. This part of the proposal would benefit from an early and clear definition of the beam quality and parameters following degrading to Coulomb barrier energies. There is a close connection between the beam specifications, the design of the beam identification and tracking system, the civil engineering for the experimental area, and the space requirements. These issues must be addressed promptly and in a coordinated way.