Gammasphere at HRIBF

draft
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As one of the most powerful gamma-ray detector arrays in the world, and the most powerful one in the US, Gammasphere has been in full operation for more than five years. During this time it has been moved from its original location at LBNL to ANL, and is now been moved back to LBNL. The principal guidance for the location of this device is based on scientific needs, but also to certain extent based on an initial understanding that the three large national labs (ANL, LNBL, and ORNL) would share the time hosting the device. During the last two moves, ORNL had decided not to host Gammasphere, because the construction of HRIBF and the associated experimental station did not allow us to do so. The question we are facing now is whether or not we should consider hosting Gammasphere in the future. This outline summarizes the background and our discussions on this issue.

1. Time scale, financial and manpower demands for the next move.

- *Time scale:*
  - Mar 2000: GS operations end at ANL.
  - May 2000: All GS components arrive at LBNL.
  - July 2000: GS operation starts at LBNL.

  - Early 2001: DOE deadline for next set of proposals for GS hosting.
  - Mid 2001: DOE decision on new GS site.
  - Mid 2002: GS operations end at LBNL.
  - Jul-Aug 2002: GS components move to new location.
  - Nov. 2002: GS operation starts at new location.
  - Nov. 2004: GS operations end at new location.

- *Operation funds:*

The operation of GS at LBNL and ANL has been funded by DOE at a level of $750k/year. This funding can cover the normal cost of maintaining the array, and the cost of hiring 1 - 2 postdoctoral research staffs who will mainly devote their time to ensure the smooth operation of GS.

- *Manpower need*s:

During normal operations of Gammasphere, it is estimated that about 1.5 FTE scientific staff plus 1.5 technical/engineering FTE must be fully dedicated to its operation and maintainance. The manpower demand for the first 6 months is obviously much higher. In addition, HRIBF will also need to hire new accelerator operators to meet the needs of a 7-day operation. The secretarial need for GS operation is estimated to be 0.5 FTE.

2. Gammasphere at HRIBF.

The HRIBF RMS was designed with the possibility of putting Gammasphere at the target position in mind. With a few minor exceptions, there should be no serious technical difficulty in positioning Gammasphere at the RMS.

It could be argued that hosting Gammasphere will increase the visibility of the facility in the nuclear structure community, bring in additional operation and research funding, and increase the scientific output of the facility. However, due to its unique mission of providing and developing radioactive beams, HRIBF faces serious challenges and potential drawbacks when hosting Gammasphere. Gammasphere has a large and politically -active users group, which has high demands and expectations for beam time and beam quality at the host lab. The current state of RIB operations at HRIBF clearly cannot satisfy these demands and expectations. It is also unlikely that in the near future the RIB operation at HRIBF will be as stable and predictable as that of the stable beams. Therefore, to satisfy the users community, HRIBF will have to devote a considerable amount of beam time to stable beam operations associated with Gammasphere. However, this in turn will severely impair the future RIB development at HRIBF. The high beam-time demand of Gammasphere users also means that the astrophysics and reactions programs will be affected. On the other hand, if the facility continues its effort in developing new radioactive beams, it can only provide a limited beam time for Gammasphere users, and unexpected shutdowns and frequent schedule changes will be inevitable. This obviously will not be acceptable for the Gammasphere users community.

The above dilemma led to our conclusion that, before HRIBF develops into a mature RIB facility, it is neither desirable for the community, nor beneficial for the facility to host Gammasphere at the time of the next move (see above time schedule). This, however, does not exclude the possibility for HRIBF to host Gammasphere in the future (beyond 2002). In fact, since HRIBF is most likely to remain the only operational RIB facility in this country for the next decade, once our RIB operation becomes more stable, it is not only possible, but also necessary for ORNL to make a strong case of hosting Gammasphere. Before RIA becomes operational, the combination of our unique RIB capability and the power of Gammasphere will no doubt provide the best opportunity for new physics in this field. For this purpose, it is important that our nuclear structure group maintain a reasonable level of activity associated with research at Gammasphere, so that when the time comes, we can have sufficient influence in the community to make the case.