CoProject Leader: Bill Lynch
CoProject Leader: Betty Tsang
• High Resolution Array (HiRA) consists of 20 telescopes that can be configured easily in different experimental set up.

• Each telescope consists of Si (65 μm, SSSD) + Si (1.5 mm DSSD) + 2x2 CsI (4cm)

• Future EOS studies with high energy to reach density above saturation requires longer CsI crystals and higher granularity. Particle decay experiments also can benefit from higher CsI crystal granularities

• HiRA_L-- Build new 2x2 10cm long CsI array to replace the current 2x2 CsI array in HiRA,
HiRA-Upgrade

• Deliverables/Goals/Project Requirements:
  – Fabricate 10 HiRA upgrade CsI(Tl) assemblies/telescopes and make them ready for experiments

• Interfaces with other projects or experiments
  – The upgrade is needed for approved experiment e10430, which is designed to detect high energy light charged particles.
  – The Chinese HiRA collaboration will provide 4 additional upgraded CsI arrays.

• Space requirements and timeline.
  – Set-up space requirements: existing HiRA laboratories.
  – Timeline and duration of the project: Jan 1, 2015 to Dec 31, 2015
Current HiRA telescope Assembly contains many parts but well documented

PLAN: Keep Si parts unchanged and simplify new CsI(Tl) assembly
Proposed design modifications
-- Reduce the number of CsI parts
Deliverables: purchase packaged 2x2 CsI arrays

Design Requirements:
Crystals fit within Pre-Existing Si Frame
Design sent out for quote
(Supplier to make gray and blue parts.)

10 cm long crystals, with
1 cm- light guides and
pindiodes at back of crystals

2x2 grids protecting the pindiodes. Final design of
pindiode grid to be determined by manufacturer.
10 cm Crystal Assembly with Dimensions
MSU Deliverables: Crystal containers (14)

Present container too small. Must fit new CsI(Tl) crystals and new preamp boxes

10 cm crystals +1 cm light guide

Design required (Crystal container and preamp box):
• Crystal container requires precision. Preamp box does not.
CsI box with 4 side-panels
Deliverables: New back-plates

Inside view

Preamp box base

PCB

DE connector

Connector for double sided E

outside view
Deliverables: 14 preamp boxes each to accommodate 4 preamps
(early stage design, used to determine packing density of PA’s)
Tasks:

- Bids on CsI(Tl) crystals evaluated and supplier selected April 28th.
- Crystal assembly housing design finalized June 5th.
- Test of single CsI(Tl) crystal completed July 1st.
- Finalize specifications of all crystals and housing drawings July 15th.
- Finalize design of preamp box and PCB’s Sept. 1st.
- Finish production of CsI(Tl) crystals housings, preamp boxes, and PCB’s Oct 1st.
- Delivery of 10 assembled boxes to supplier October 15th.
- Delivery of 10 crystal assemblies in their enclosures to MSU November 15th.
- Project completion December 1st.
- 1 month contingency

Utilities requirements do not exceed present resources.

Timeline and duration of the project: Jan 1, 2015 to Dec 31, 2015