eRD1: Crystal Calorimeter Development for EIC based on PbWO4

Status

- ❑ Crystal characterization for crystal specifications and impact on EIC detector performance
  - ➢ Work towards finalizing individual crystal testing infrastructure largely complete. Work towards testing systematics between setups
  - ➢ Results for 2014/15 crystals and setting up to test crystals being produced in 2017 in collaboration with NPS project
  - ➢ Crystal chemical analysis methods established and initial results on contribution of impurities&defects and stoichiometry. Work towards developing non-destructive sampling methods
- ❑ Prototype construction to establish limiting energy and position resolution and to test readout systems
  - ➢ Work towards construction of a prototype to test different readout options, e.g. APD and PMT
  - ➢ Beam test results with SiPM readout

FY18 - plans

- **Crystal characterization for crystal specifications and impact on EIC detector performance**
  - Evaluate systematics between setups
  - Characterize, including chemical analysis, 460 SICCAS crystals being produced in 2017 in collaboration with NPS project
  - Test CRYTUR later growth cycle crystal
- **Prototype to establish limiting energy&position resolution, and, together with simulations, to evaluate options to reduce the constant term**
  - Construct prototype assuming suitable number of crystals is available
  - Calibrate prototype with tagged photon beam at JLab
  - Together with simulations evaluate uniformity of crystal reeponse and statistical fluctuations of containment losses
- **Test different readout options**
  - PMTs may be a viable option since not directly in magnetic field
  - Evaluate photodiode readout options and long term stability

FY18 – preliminary budget

Item	FY18 ($)	FY19 ($)
Procure crystals from Crytur		
Radiation studies	10	
Technical Support	5	15
Parts for prototype and construction	25	
Parts for readout systems	15	15
Travel	15	15
Parts for cooling system		40
TOTAL	**70**	**85**