

PRad Collaboration Major Achievements

(for the past 4 years)

- 1) New PRad-II experimental proposal had been developed and approved by PAC-48 with an “A” scientific rating (E12-20-004) in 2020
(A. Gasparian, H. Gao, D. Dutta, N. Liyanage, D. Higinbotham, H. Nguyen, E. Pasyuk, Chao Peng, W. Xiong)
- 2) New X17-Search experimental proposal had been developed and approved by PAC-50 with an “A” scientific rating (E12-21-003) in 2022
(A. Gasparian, H. Gao, D. Dutta, N. Liyanage, T. Hague, Chao Peng, R. Paremuzyan)
- 3) Transition to new fADC-based DAQ system has been successfully finalized
(for the PbWO₄ part, for now, thanks to JLab/Hall B administration).

PRad Collaboration Major Failures (for the past 4 years)

- 1) We failed to upgrade the HyCal calorimeter to all PbWO_4 crystal high resolution detectors despite two large-scale NSF instrumentation proposals.
 - a) that forced us to run the PRad-II experiment new energies ($E_e = 0.7, 2.1$ and 3.5 GeV).
 - b) a significant deviation from the PRad experimental approach (philosophy).
 - c) hope the quality of our experiment will not suffer from this change.

- 2) The X17-Search experiment also would gain significantly from all PbWO_4 HyCal (though it is approved with the current HyCal).

Collaboration Tasks for the Next 2 Years

- 1) Construct and test all remaining **beamline** elements before August 2025
- 2) Test and repair **HyCal** calorimeter with cosmic rays and LMS, prepare for the beamline installation in August 2025.
 - a) test all signal and HV cables;
 - b) test and repair all CAEN HV channels;
 - c) test the chiller, purchase a spare one;
 - d) develop and install new interlock system.
- 3) Test the PRad's **gas flow target**, ready for the installation after the X17 experiment.
- 4) Construct and test **GEM detectors** (4 detectors for 2 plains), ready for installation August 2025
 - a) Integrate GEM readout with DAQ;
- 5) Construct and test veto scintillators, assemble in the target chamber and test. Ready to install after the X17 experiment.
- 6) Install new **fADC-based DAQ electronics before February 2025**. Full tests from August 2025.

Collaboration Tasks for the Next 2 Years (Cont.)

- 7) Develop **new DAQ software** based on previous PRad experiment. Partial tests before Feb. 2025. **Final tests with HyCal and GEMs from August 2025.**
- 8) Develop **on-line data quality control and monitoring software**, tests from August 2025.
- 9) Start development of the off-line data analysis software. To be ready by Nov. 2025.
- 10) Perform PRad-II and X17-Search experiments, accumulate high quality experimental data sets. 2025-2026.
- 11) Parallel to experiments start an intensive data analysis work with a goal to extract the Preliminary results by the end of 2026.