

Development and science perspectives of the POLAR-2 instrument: a large scale GRB polarimeter

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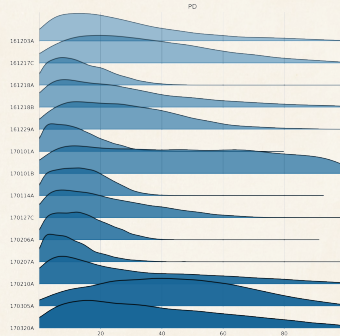
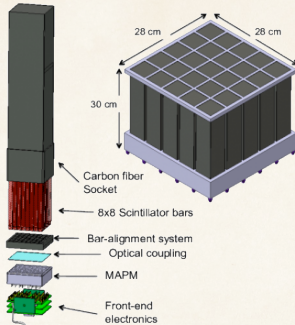
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²<https://www.unige.ch/dpnc/polar-2>

GRB polarization measurements with POLAR



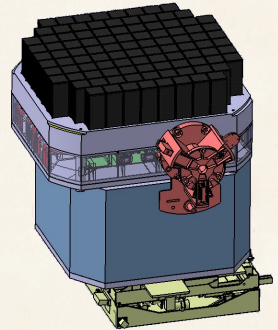
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- POLAR was a dedicated gamma polarimeter composed of a 40×40 scintillator array
- Each of the 25 modules made of 64 plastic scintillator bars and readout by MA-PMTs
- 30kg instrument, 50-500keV, half-sky FoV, $\sim 300\text{cm}^2$ effective area at 400keV
- Launched in Sept 2016 on the TG-2 Chinese space lab for 6 months of operation
- Detected 55 GRBs, 14 GRBs analyzed, globally low PD, hint for time-evolving PA
- More statistics are needed \Rightarrow bigger and more sensitive instrument: POLAR-2

The POLAR-2 mission: a large scale GRB polarimeter

- Large scale GRB polarimeter based on POLAR legacy
- 4 times bigger than POLAR (from 25 to 100 polarimeter modules), 10 times more efficient (thanks to an improved design of the polarimeter modules)
- Lowered energy threshold to a few keV, equipped with spectrometer modules (CeBr3 or LaBr3)
- Launch to China Space Station early 2024
- Swiss (UniGe), Chinese (IHEP), Polish (NCBJ), and German (MPE) collaboration, more info on <https://www.unige.ch/dpnc/polar-2>



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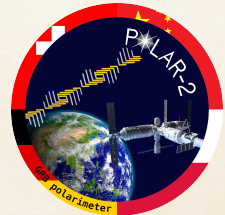
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Preliminary module and full instrument performances

- Light yield went from 0.3p.e./keV with POLAR to 1.6p.e./keV, thanks to a larger contact surface between scintillators and photo-sensors and the use of SiPM which increased the PDE
- Energy threshold can therefore go down to a few keV, increased sensitivity at low energies
- Cross talk reduced by an order of magnitude
- Effective area simulated on Geant4, bigger than POLAR*4, especially at low energies (thanks to technological upgrades)

Proceeding:



pos.sissa.it/395/580/

