Report 4.4 SolpeX within KORTES - ISS
FIAN– SRC Solar Phys. Division Wroclaw
November 2013 – May 2015

Main science task:

- detect polarisation in flare soft X-rays by means of Bragg spectroscopy

Secondary:

- perform high resolution spectroscopy at Brewster angle ~ 4.3Å
- test new concept of very fast scanning drum flat crystal Bragg spectrometer

Polish-Russian IAWG

How to measure polarisation using Bragg reflections

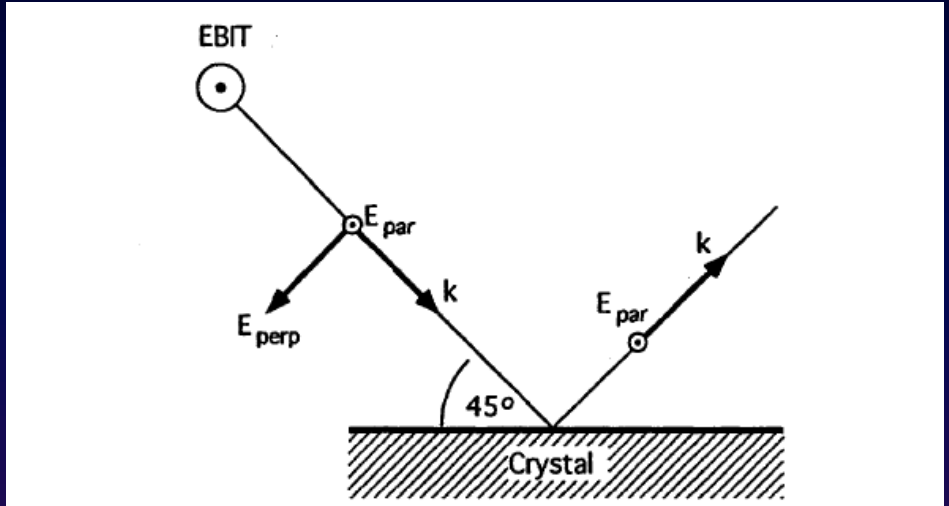
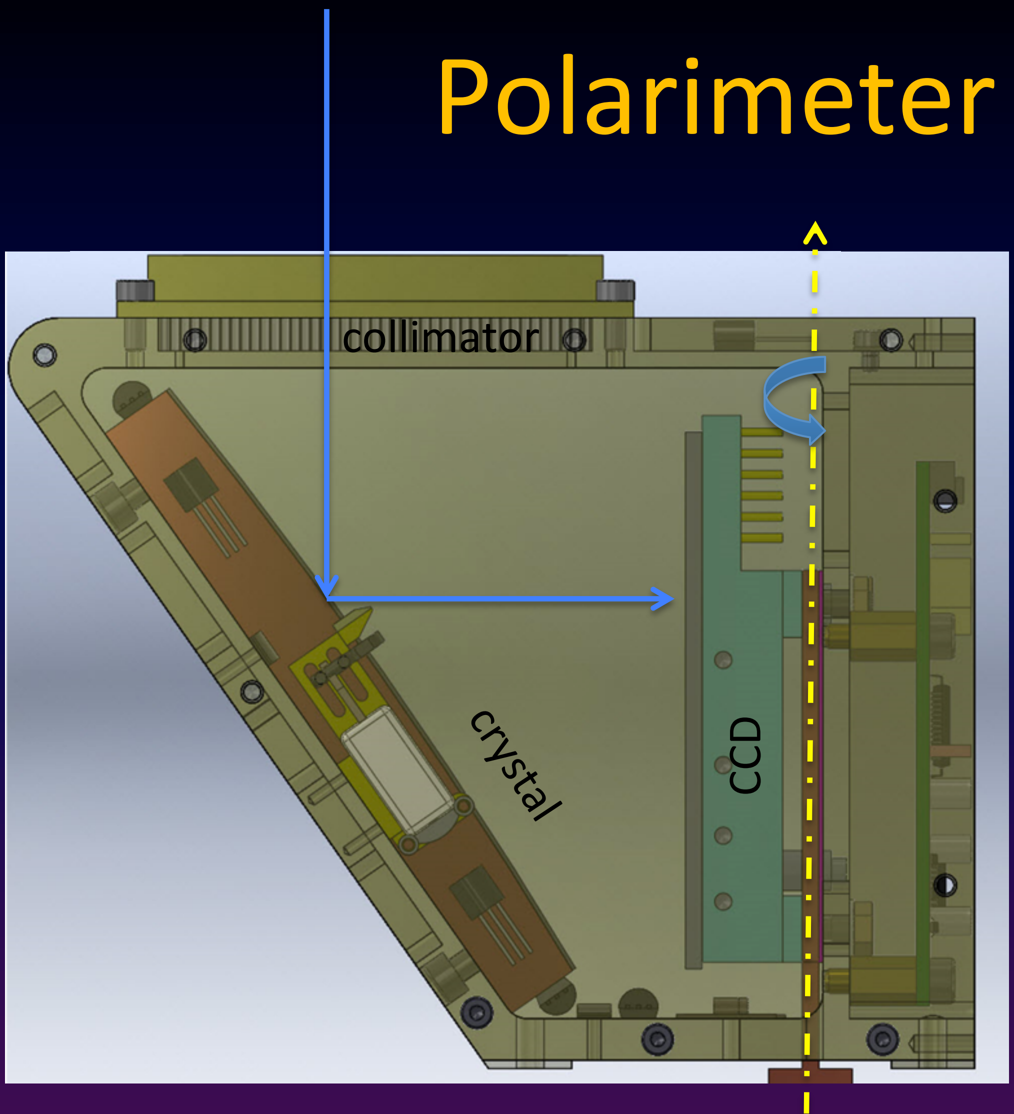


Figure 5: Schematic diagram of the reflection of linearly polarized x rays off a crystal surface at a Bragg angle of 45°. The electron beam is in the direction out of the page as indicated at the EBIT position. The plane of dispersion of the crystal is perpendicular to the beam direction. Only the parallel polarization state is reflected; the polarization state perpendicular to is completely absorbed by the crystal.

Polarimeter concept



The crystal-detector section is oriented on the flare in progress

This section rotates around the pointing axis

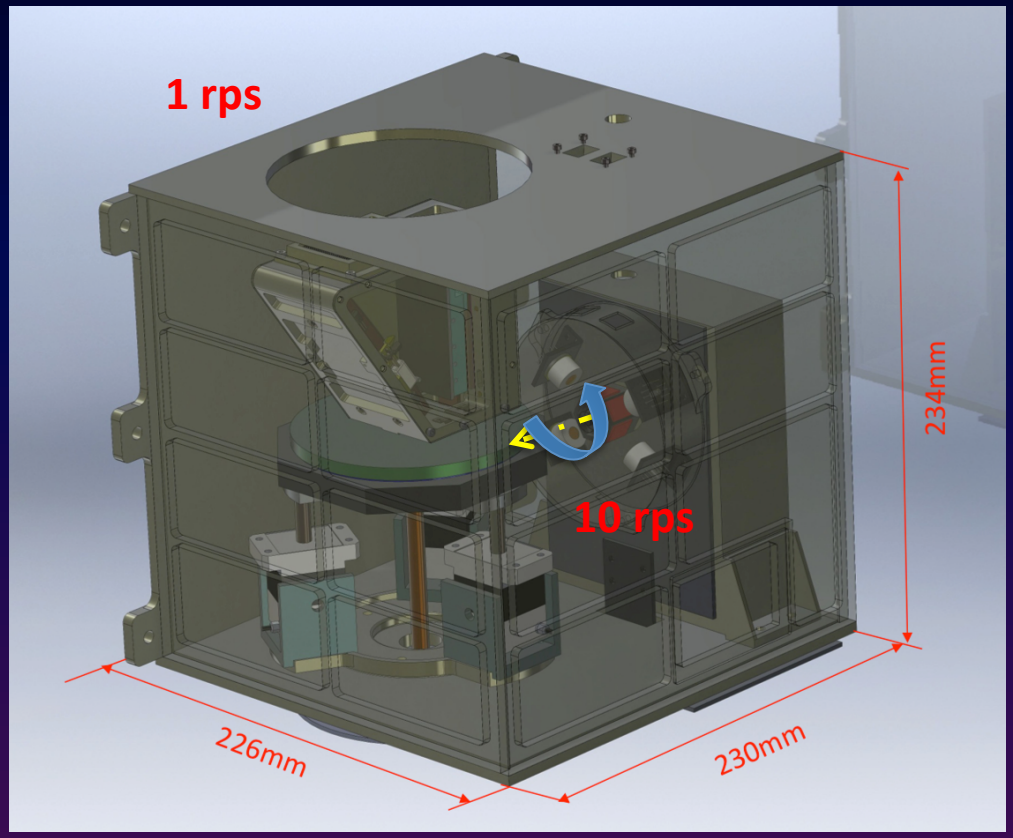
Modulation of the spectra with rotation phase is detected

If present it is interpretted in terms of degree and plane of the polarisation

If present will add missing info on directivity of nonthermal beams causing X-rays

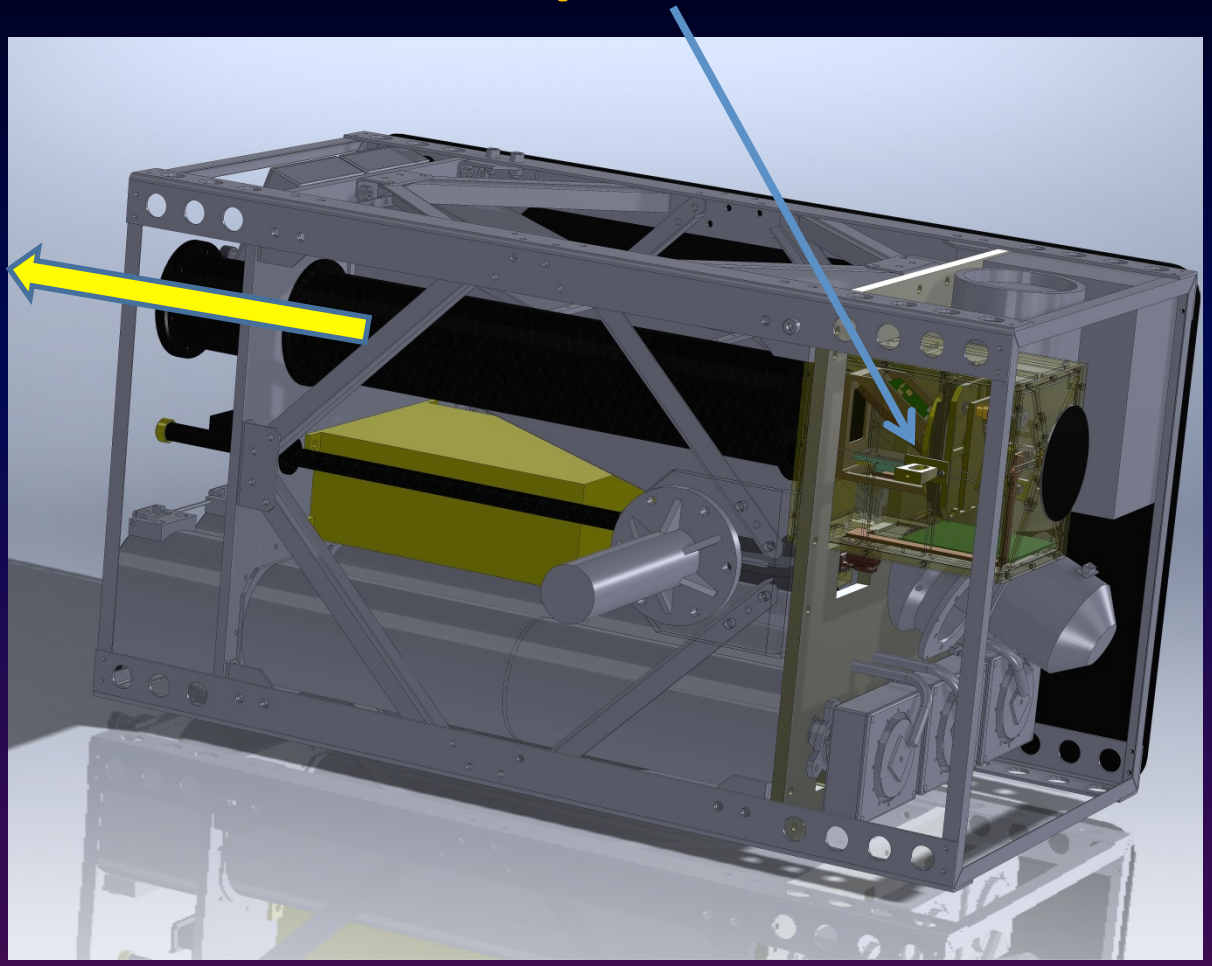
Inside Cortez Russian module mass: 10 kg, power 30 W, data rate 1Gb/24h

Drum spectrometer concept



- The flat crystals are placed on the rotating drum (10 rpm)
- Bragg reflections are recorded by four SDD detectors
- Every detector count is timed to 1 microsecond
- This translates to wavelength
- Spectrum is created in tims on every detector
- Full coverage 1- 25 Å
- ~1s time cadence possible for flares of M class

SolpeX within KORTES



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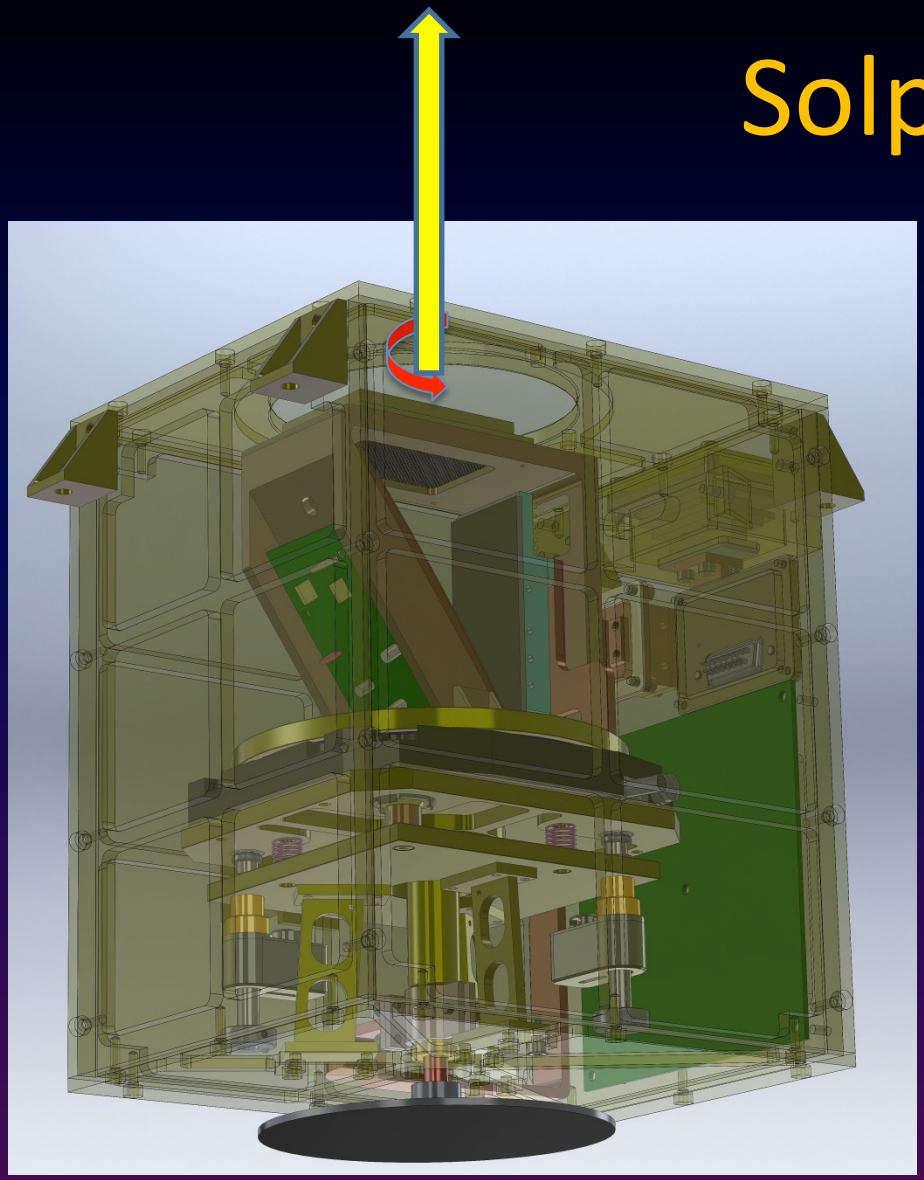
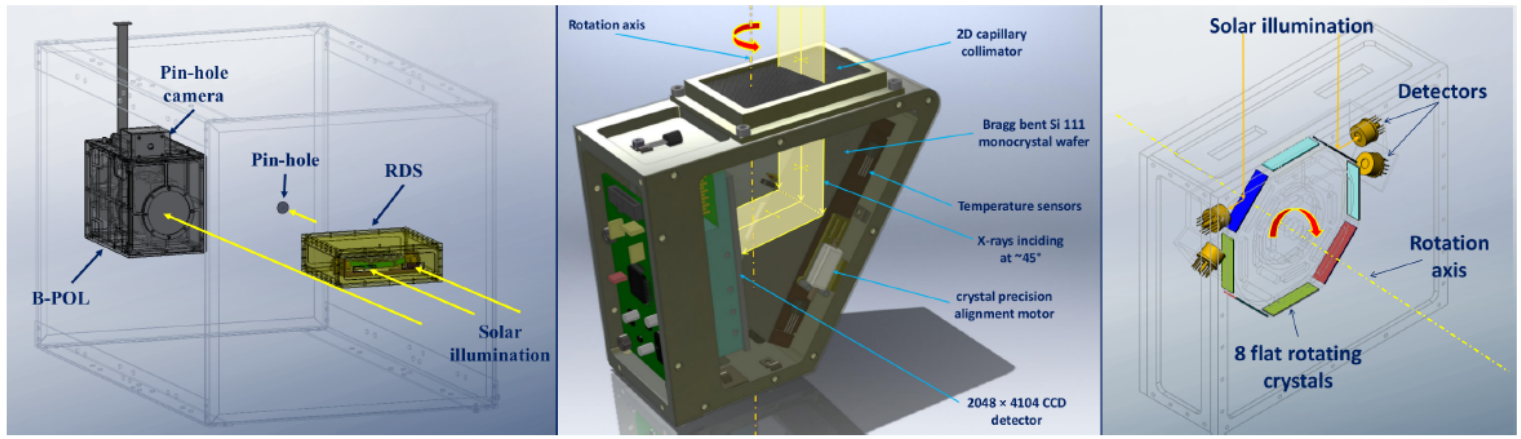
SolpeX



- The unit rotates 1 rps
- Spectra are taken several times per rotation
- Large CCD 6 cm x 3 cm is cooled by rotating radiator
- The system is actively pointed towards the flare as seen by the hin-hole camera X-ray imager
- The pointing platform can react quickly in order to find a new target

Papers published/submitted



Polarimetry: From the Sun to Stars and Stellar Environments
Proceedings IAU Symposium No. 305, 2015
A.C. Editor, B.D. Editor & C.E. Editor, eds.

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SolpeX: the soft X-ray flare polarimeter–spectrometer for ISS

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Conclusions:

the construction is in progress
new technological solutions under scruitin overlook

Thanks for your help