SOLARNET WP8 - SPRING meeting II HELLRIDE : A test bench for the back-end of SPRING. Hemanth Pruthvi, KIS Markus Roth, KIS

Dirk Soltau, KIS

### Flow

• Introduction

### • HELLRIDE present status

- Upgrades
- Component procurement
- Data pipeline
- PyAstroPol
- Future

# Setup



# **Polarimeter + Broadband Imager**



# **Sensitivity estimations**

Parameter	Fe I 6302	Ca II 8542
Center wavelength	6302.5 Å	8542.05 Å
Number of points	21	31
Wavelength step	50 mÅ	70 mÅ
Instrumental broadening	50 mÅ	70 mÅ
Cadence in sec	10	20
Duty cycle	50%	50%
Spatial extent	0.063 arcsec	0.126 arcsec
Noise level B <sub>LoS</sub>	14 G	98 G
Noise level V <sub>LoS</sub>	48 m/s	350 m/s

## Additions and Upgrades



#### Etalon redesign

#### **Custom Mechanics**



# **Controls and Timing**





### **Component Procurement**

- Detectors 3x XIMEA 2048 x 2048 sCMOS with global shutter.
- Polarimetric analyser assembly polarizing beam splitter + 2 exit polarizers
- 90:10 broadband custom beamsplitter

- Opto-mechanics for the assembly and lab testing – motorized and manual stages, holders etc.
- Electronics requirements still need to be fulfilled.

# Data pipeline

- It under development from scratch, completely in *Python*.
- Flat fielding, calibration are functionally ready.
- Work is needed to reduce flat fielding residual features.
- Future: integrating polarimetric routines and image reconstruction routines.

# **PyAstroPol**

- A Python package developed to evaluate instrumental polarization, by means of polarized ray tracing.
- It can be easily integrated into the data processing pipeline, without any dependency on commercial/other programs.
- This can be used to create any future telescope's model.



# Summary

- HELLRIDE is under upgradation with
  - Refurbishment of etalon—1.
  - Polarimeter and broadband imager development.
  - Data pipeline development with integrated instrumental polarization corrections and image reconstruction.

• This will be used as testbed for SPRING post-focus instrumentation, sample data and design lessons.

### Future

- 2 campaigns in 2021B technical campaign and science campaign.
- A parallel campaign to produce full disk sample data using the HELLRIDE back-end.
- HELLRIDE will be offered under SOLARNET program as well, for science as well as technical campaigns.

Hemanth Pruthvi Postdoc, Instrumentation

Expertise : Instrument design and development (especially optics and control software), data reduction subroutines development, and field work (such as testing, observations etc.).

2019 - 2021 : HELLRIDE new control software development, calibration of instrument and its components, and planning of its upgradation with polarimeter and broadband imager.

2021 – 2022 : Execution of HELLRIDE upgradation with polarimeter and broadband imager, observations with the latest instrument, and offering it to the solar physics community.