



Feasibility study of a UV photometer on-board a 3U Cubesat for the study of bright massive stars

STAR Meeting
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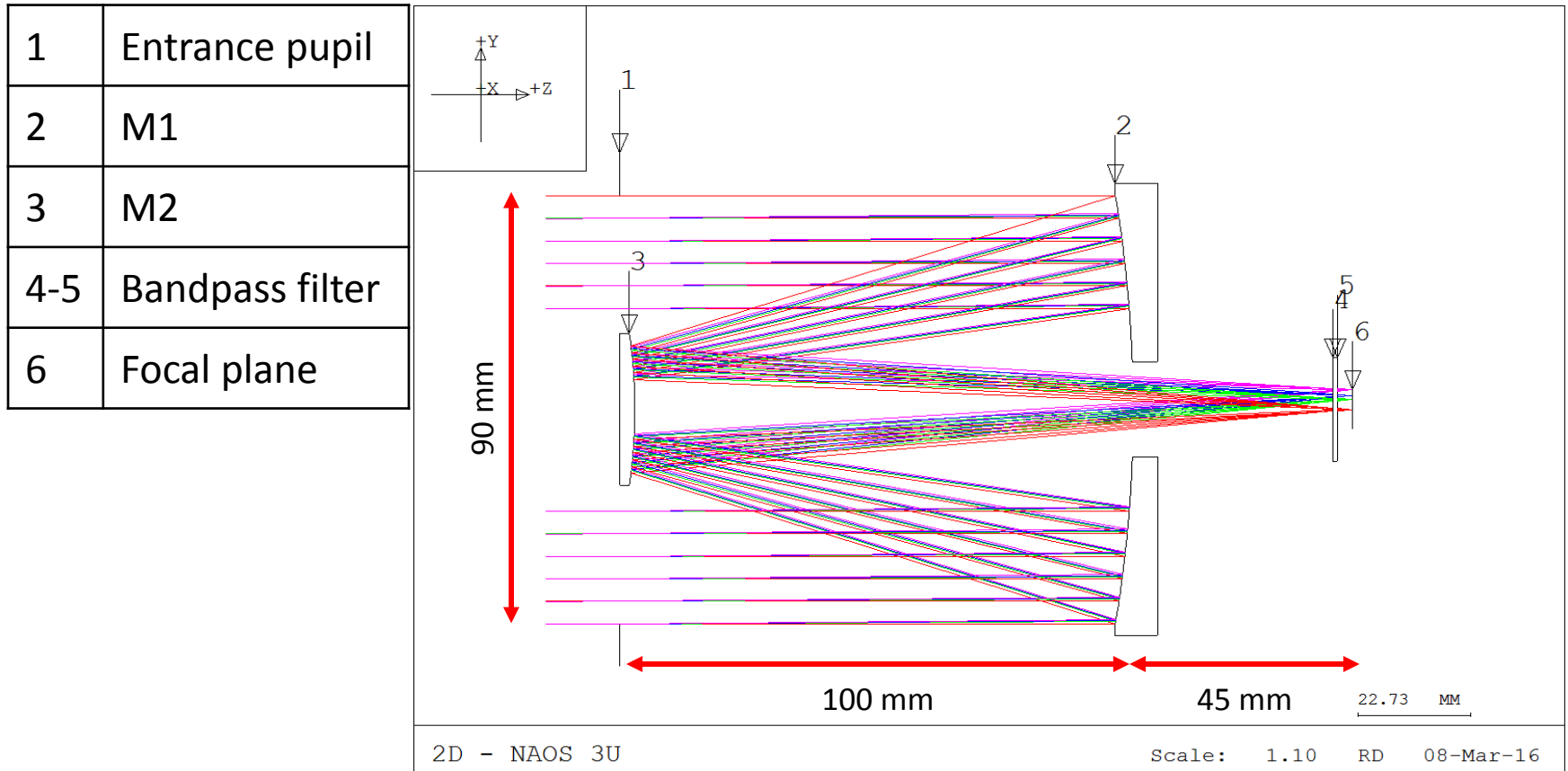
Introduction

- PhD Research topic
 - Feasibility study of a **UV photometer** on-board a **3U Cubesat**. The scientific purpose of the payload is to collect time series of photometric measurements of **bright massive stars**.
- Time schedule: from December 2013 to December 2017
- This research is funded through the ARC grant for Concerted Research Actions, financed by the Federation Wallonia-Brussels

Near-UV Photometer requirements

- Optical performances needed:
 - Collect and focus star light from 250 to 350 nm (no wavelength dispersion)
 - Signal to noise ratio ≥ 1000 in less than 5 minutes for star magnitude $V \leq 5$
- Scientific optical requirements: **FoV $\geq 1^\circ$, $\Delta\theta \leq 15''$**
- Geometrical constraints:
 - Entrance pupil diameter ≤ 90 mm
 - Payload volume $\leq 1.5U$ (from entrance pupil to focal plane)

Near-UV Photometer design



Near-UV Photometer characteristics

- Optimized FoV = 1°
- Entrance pupil diameter = 90 mm
- Effective diameter = 80 mm
- Angular resolution = 11 arcsec
- Detector: back-thinned CCD with $13 \times 13 \mu\text{m}$ pixel size working in 2×2 binning mode

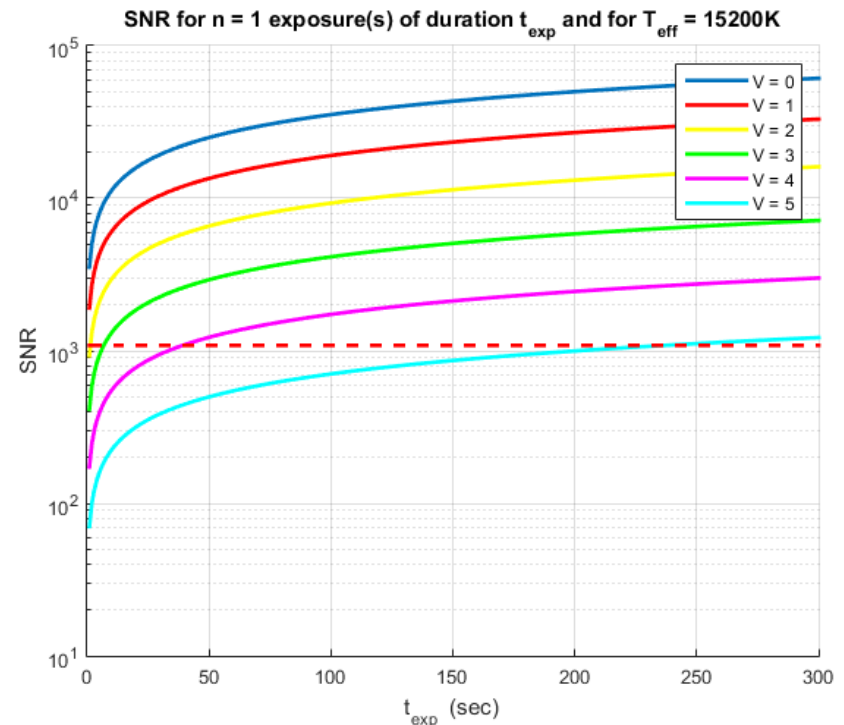
Worst case for
photometric budget:

- « Cold » star

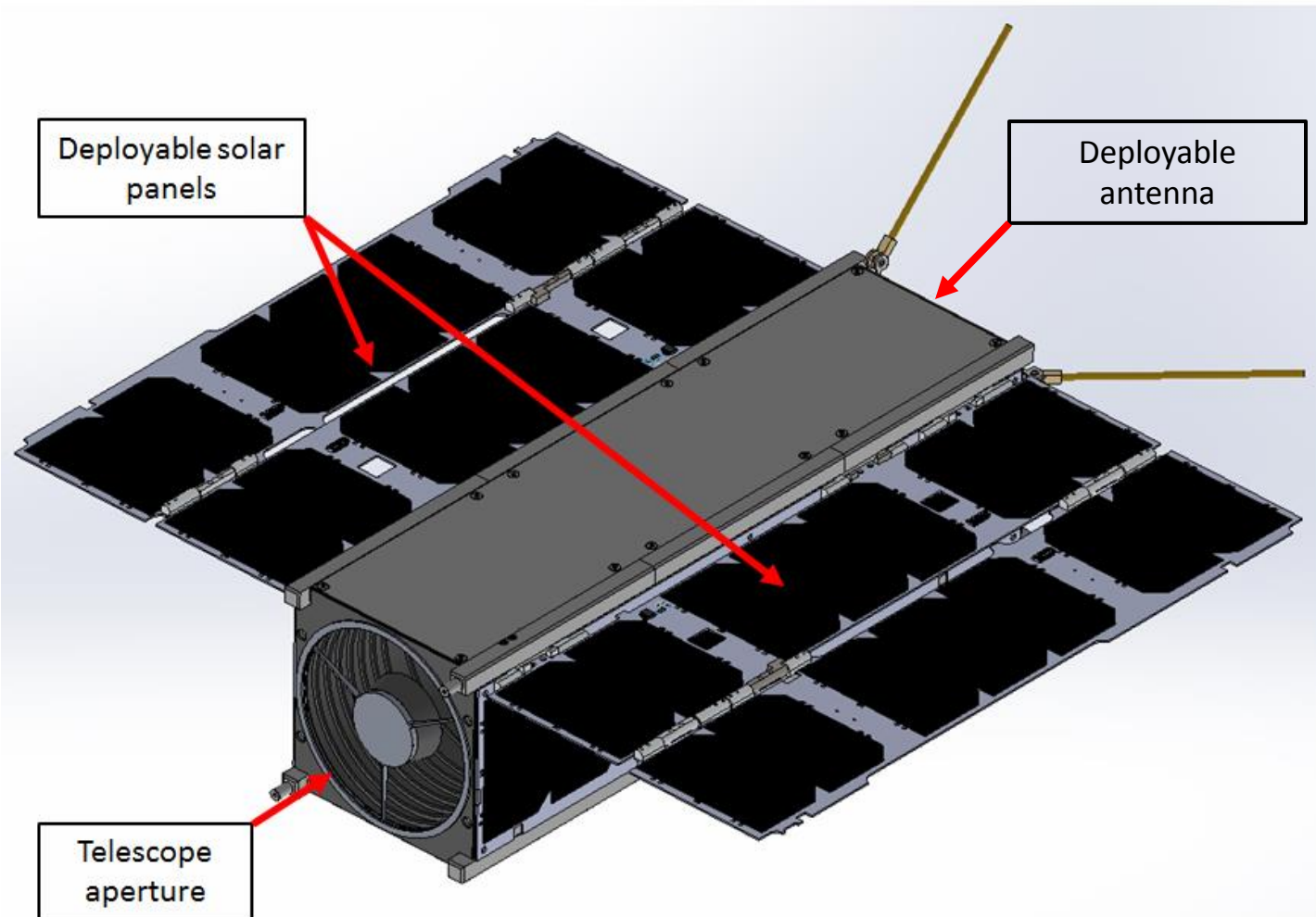
($T_{eff} \approx 15000K$)

- Hot observational case

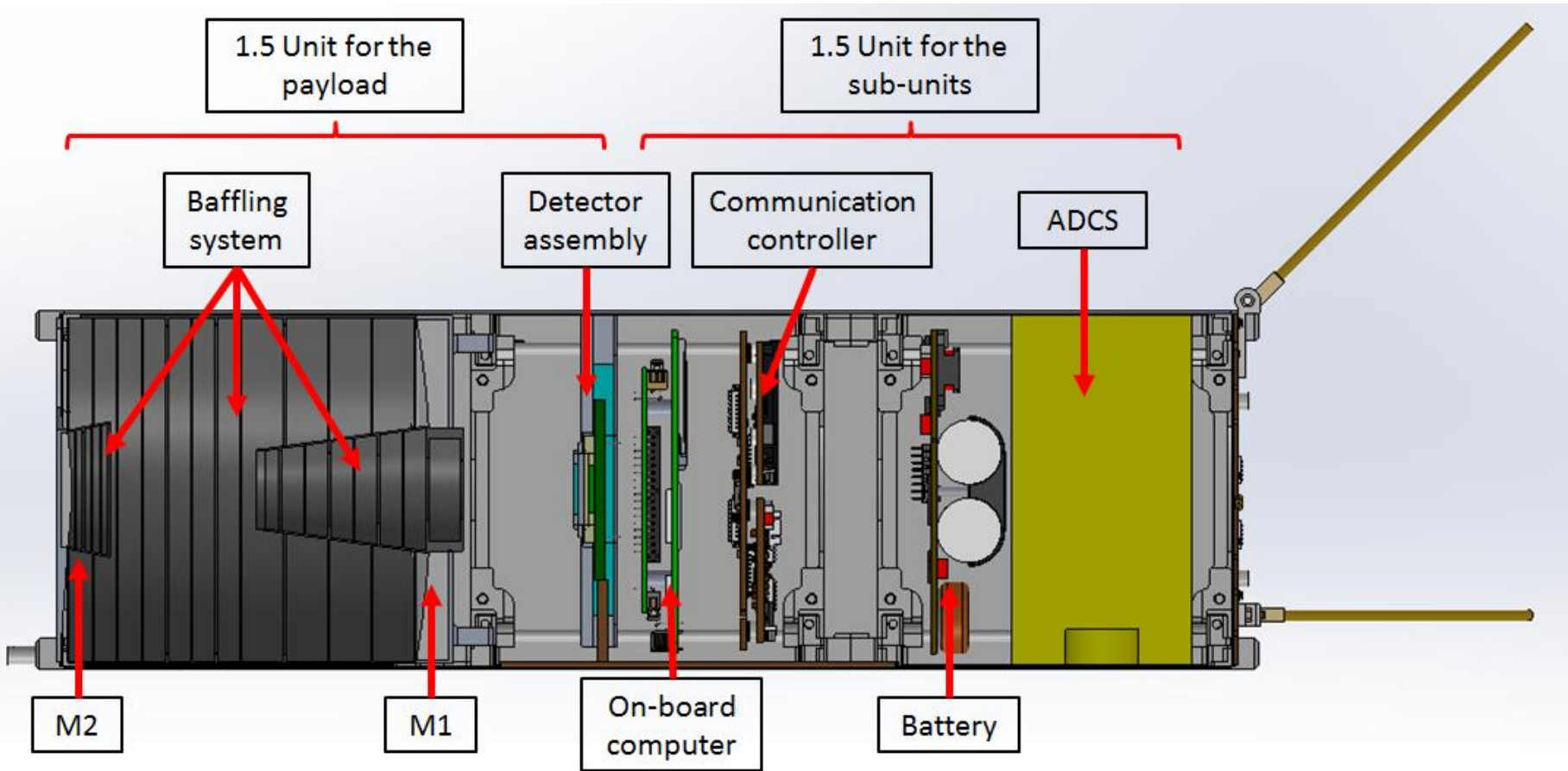
(T_{CCD} is max)



3U Overview



3U Overview



Conclusion

- 3U Cubesat project demonstrates that a high level scientific mission is achievable with very small spacecraft platforms
- Heritage from the 3U Cubesat project:
 - The 3U study is extended to a 6U study that will carry a UV **spectropolarimeter** for the study of bright massive stars
 - The polarimeter is a static system that allows measuring the entire polarimetric state of the incident light. It could be used as a **technology demonstrator**.

Thank you !