

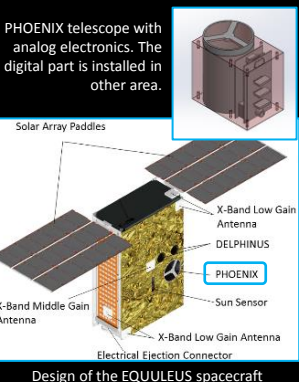
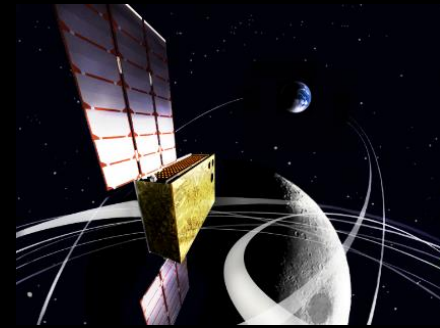
# Development of the small EUV imaging device PHOENIX for the EQUULEUS mission

M. Kuwabara<sup>1</sup>, K. Yoshioka<sup>1</sup>, G. Murakami<sup>2</sup>, I. Yoshikawa<sup>1</sup>, R. Funase<sup>1</sup>, and EQUULEUS project team

<sup>1</sup>The University of Tokyo, <sup>2</sup>ISAS

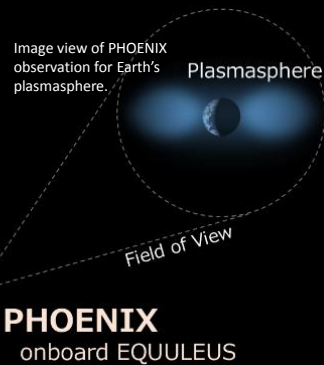
## EQUULEUS/PHOENIX

The nano-spacecraft mission **EQUULEUS (6U)** as one of the 12 “secondary payloads” of **Space Launch System (by NASA)** which will be launched in Sep. 2018 is now under development. EQUULEUS will fly to a libration orbit around the **Earth-Moon L2 point**. The EUV telescope which is named **PHOENIX** will be boarded on the nano-spacecraft to observe the Earth’s plasmasphere. [EQUULEUS size: 10 x 20 x 30 cm]



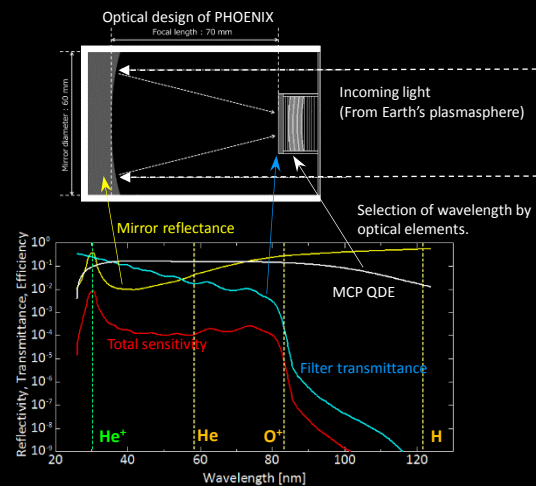
## PHOENIX objectives

By flying far from the Earth, **the entire image of plasmasphere** can be obtained. The image **from the equatorial plane** helps us to understand the dynamics of plasmas along the magnetic field. The behavior of plasmas which is related to the solar activity is key for understanding the physics and evolution of the Earth’s environment.



## PHOENIX design

PHOENIX consists of an entrance mirror ( $\phi 6\text{cm}$ ), metallic thin filter, photon counting detector, and electronics. The mirror is optimized for the emission line of **He<sup>+</sup> ( $\lambda=30.4\text{ nm}$ )**. The lights from another sources (**HI 121.6nm**, **OI 83.4nm**, **HeI 58.4nm** and etc.) are eliminated by metallic thin filter. The quantum efficiency which is higher at 30.4 nm than longer ones also select the wavelength. The design concept is almost identical to the UPI/TEX on KAGUYA (2007), and IMAE/EUVI on ISS (2012).



## PHOENIX status

- Optical design ... fixed (same as UPI/KAGUYA and EUVI/IMAP).
- Surface of the mirror... covered by Mg/SiC.
- Bandpass filter... C/Al/C (metallic thin filter), design fixed.
- Photon detector... 3 staged curved MCP and triangle RAE.
- Analog electronics design... fixed (same as PHEBUS/EUV on BC).
- The shutter mechanism (sun shield) is now under development...
- EM will be manufactured until early 2017.
- FM will be manufactured until May 2017.
- EQUULEUS will be sent for NASA summer in 2018.

