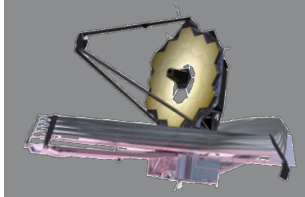

JWST und NIRSpec
- auf der Suche nach dem ersten Licht -

Torsten Böker, European Space Agency

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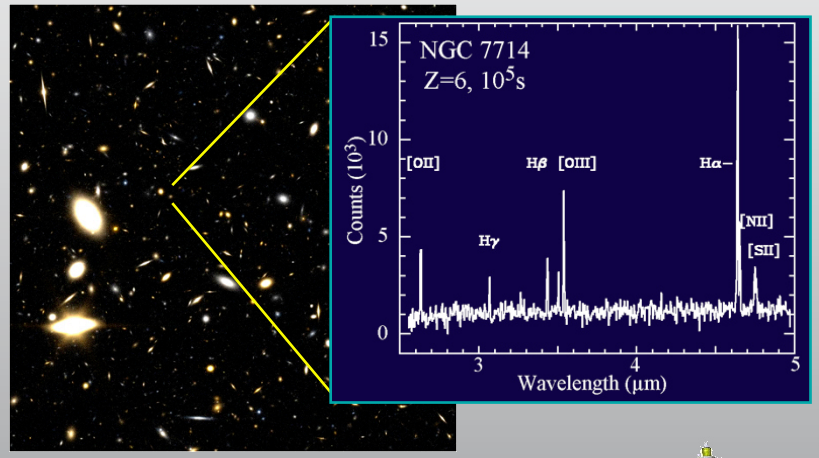
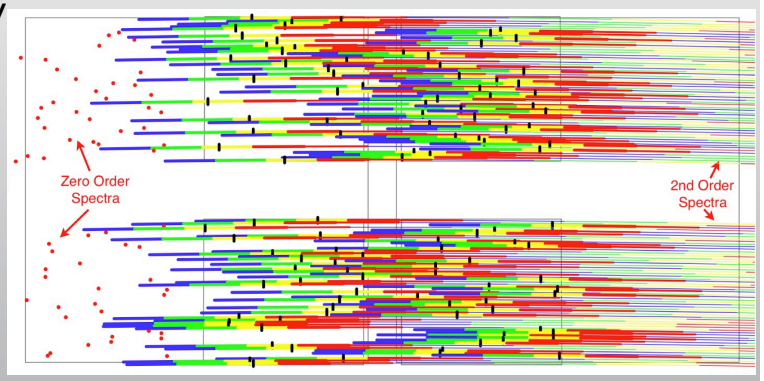
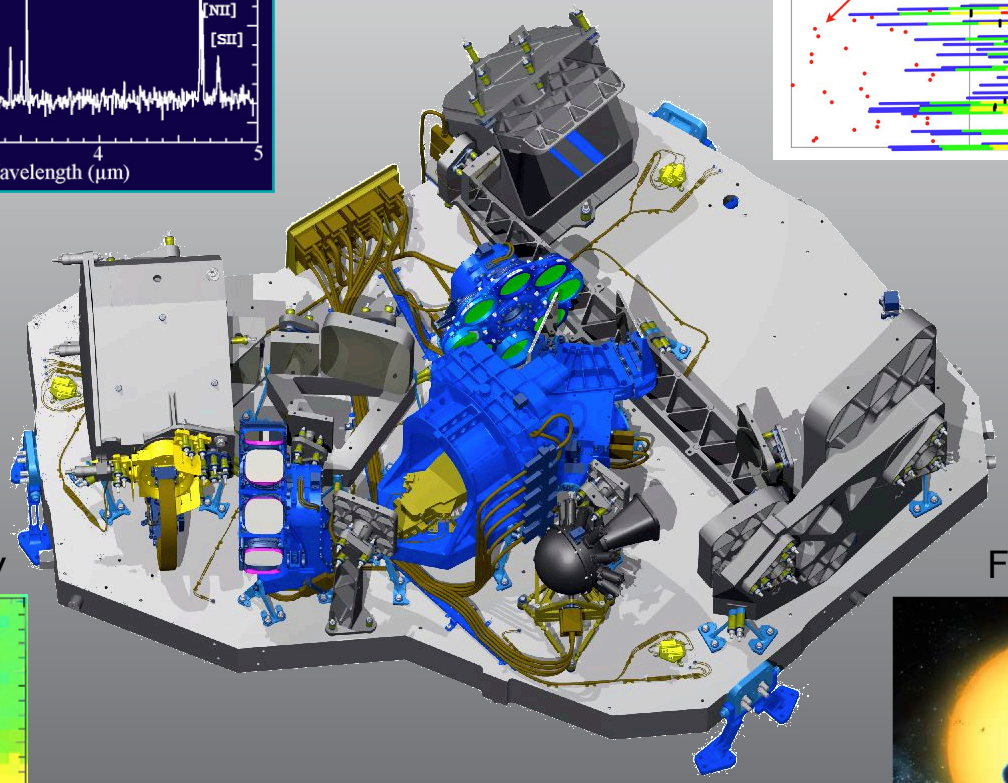
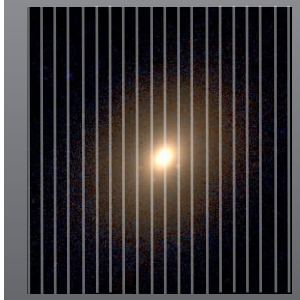
Multi-Object Spectroscopy

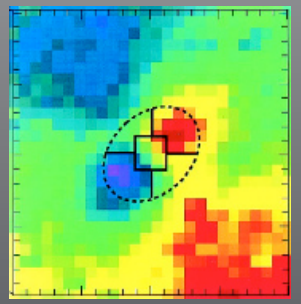




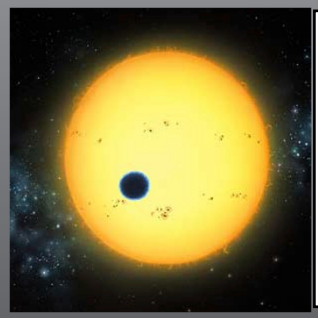


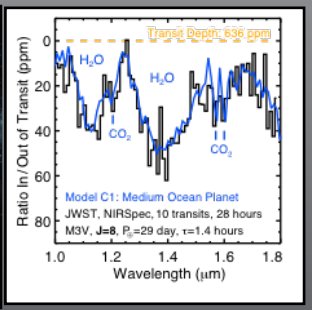
Integral-Field Spectroscopy

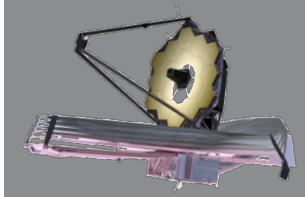




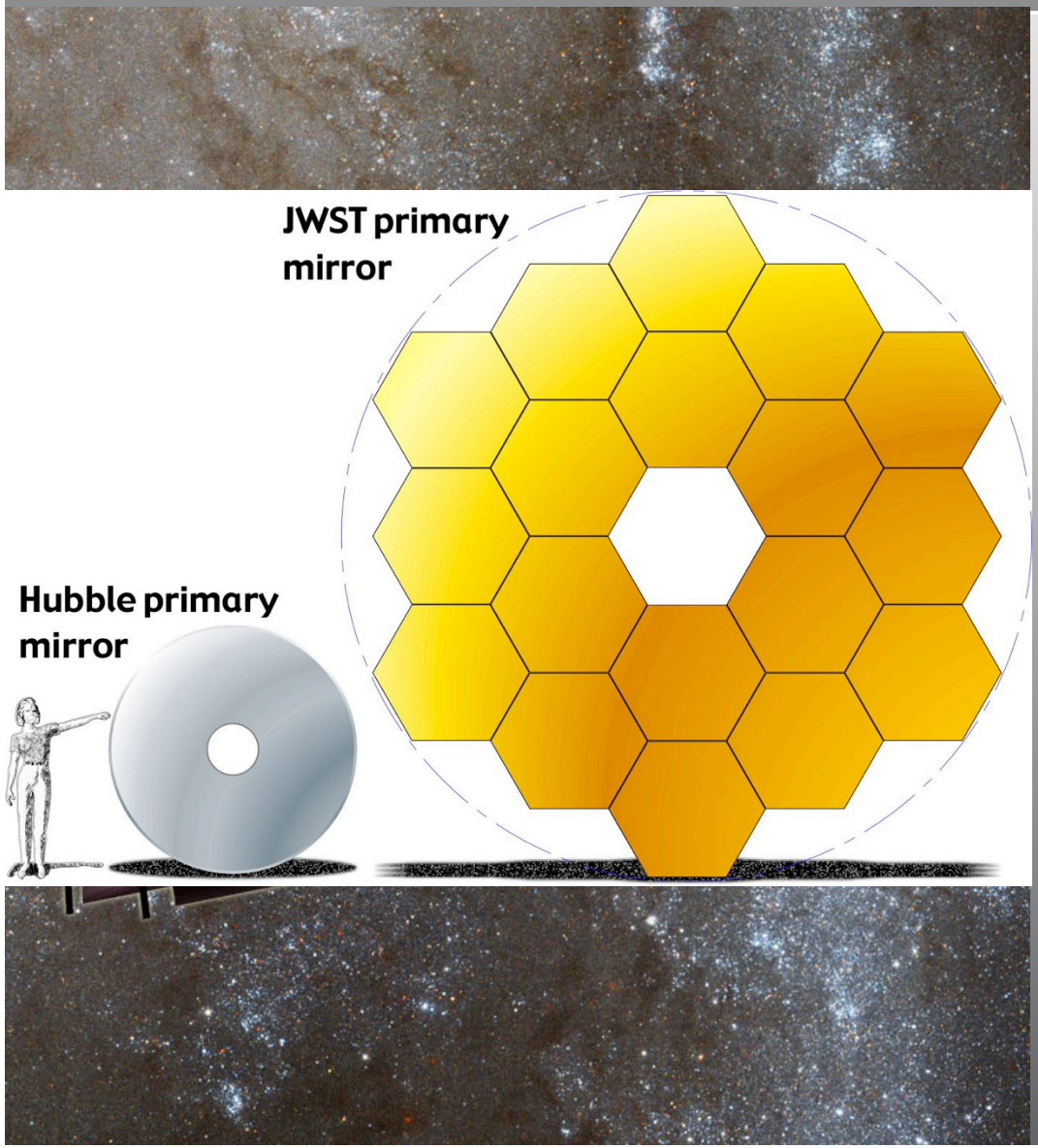
Fixed-Slit Spectroscopy





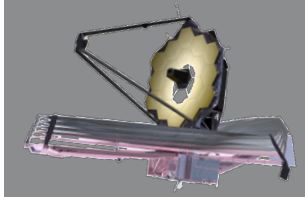


Was ist JWST?

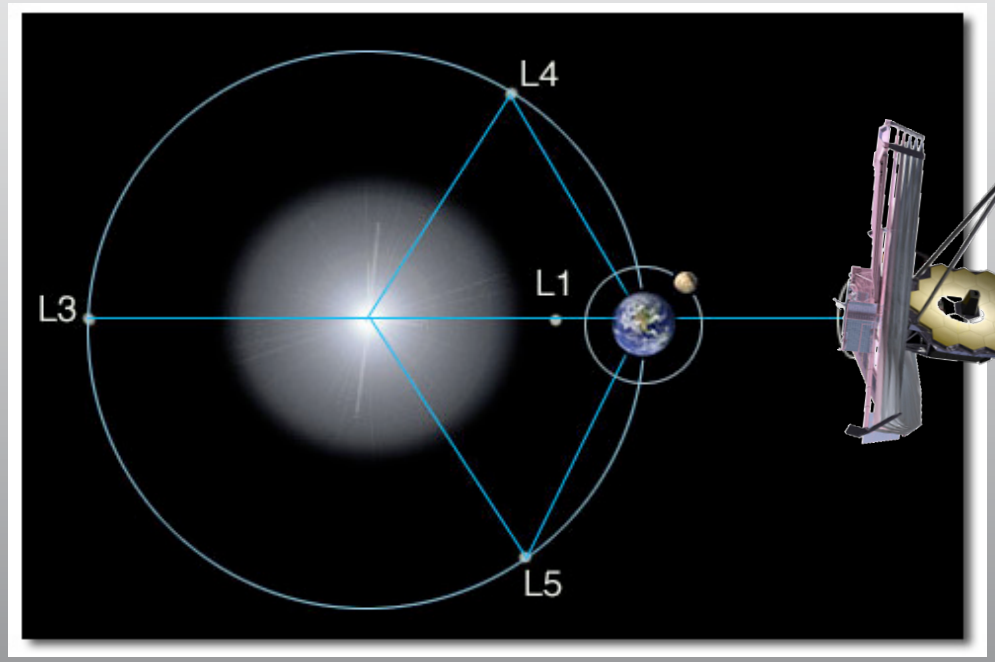


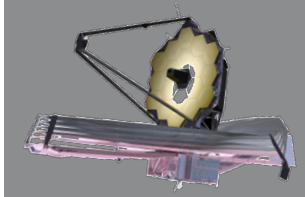
Das James Webb Space Telescope:

- Kollaboration zwischen NASA, ESA und CSA
- Wissenschaftliche Nachfolge des Hubble ST
- segmentierter Hauptspiegel mit 6.5m Ø
- Betrieb im nahen und mittleren Infrarot (Wellenlänge von 0.6–28 µm)
- passive Kühlung auf -220° C
- Orbit um 2. Lagrangepunkt (L2)
- Start 2018 auf Ariane 5 ECA
- Missionsdauer 10 Jahre



Was und Wo ist L2 ?





Die vier Fokalinstrumente

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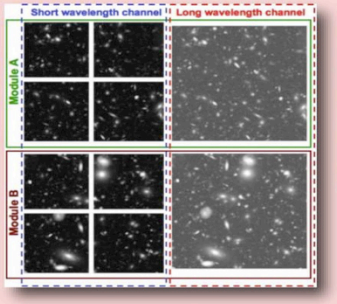
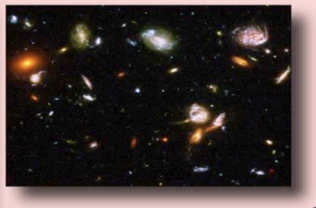
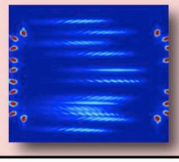
Deep, wide field broadband-imaging

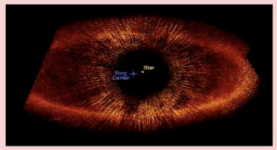




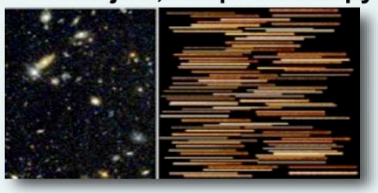
Wavefront Sensing & Control (WFSC)



Coronagraphic Imaging

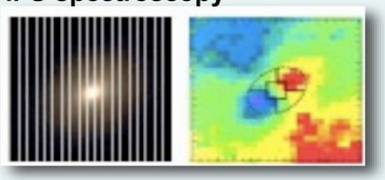


Multi-Object, IR spectroscopy



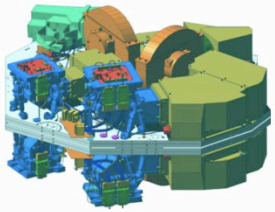
EADS astrium

IFU spectroscopy

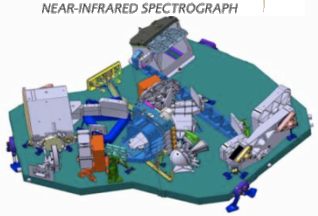


Long Slit spectroscopy

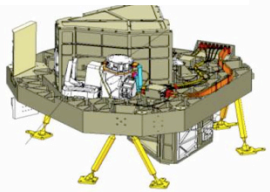
NIRCam



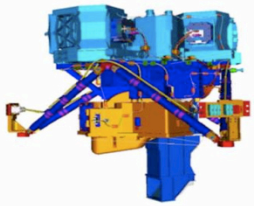
NIRSPEC
NEAR-INFRARED SPECTROGRAPH



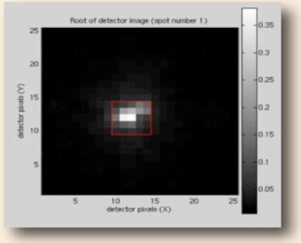
FGS/NIRISS



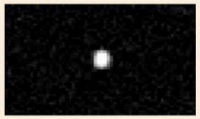
MIRI



Fine Guidance Sensor

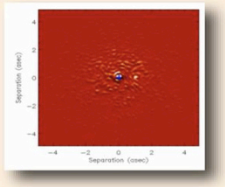


Moving Target Support



R=100 Narrowband Imaging

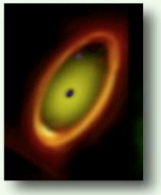
Coronagraphic Imaging R~100



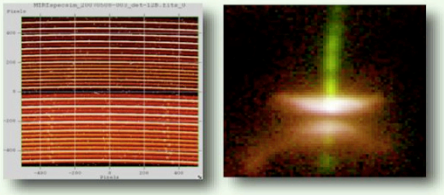
Mid-Infrared Imaging

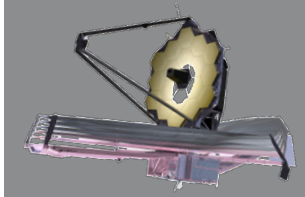
EADS astrium

Mid-IR Coronagraphic Imaging



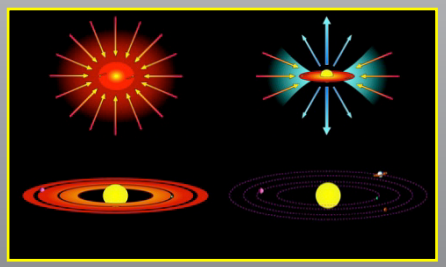
IFU spectroscopy

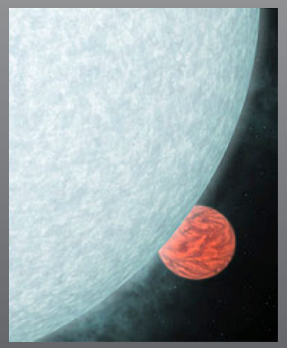


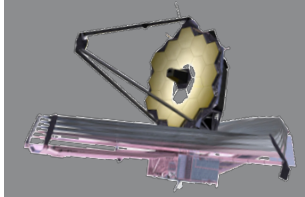


Die wissenschaftlichen Ziele

- Untersuchungen des frühen Universums, insbesondere der ersten Sterne und Galaxien nach dem Urknall
- Studium der Galaxienformation und –entwicklung
- Durchdringung dichter Staubwolken, um junge Sterne und ihre Staubscheiben zu untersuchen
- Untersuchung der Planetensysteme naher Sterne, und ihrer Bedingungen für das Entstehen von Leben







Die Geschichte des Universums

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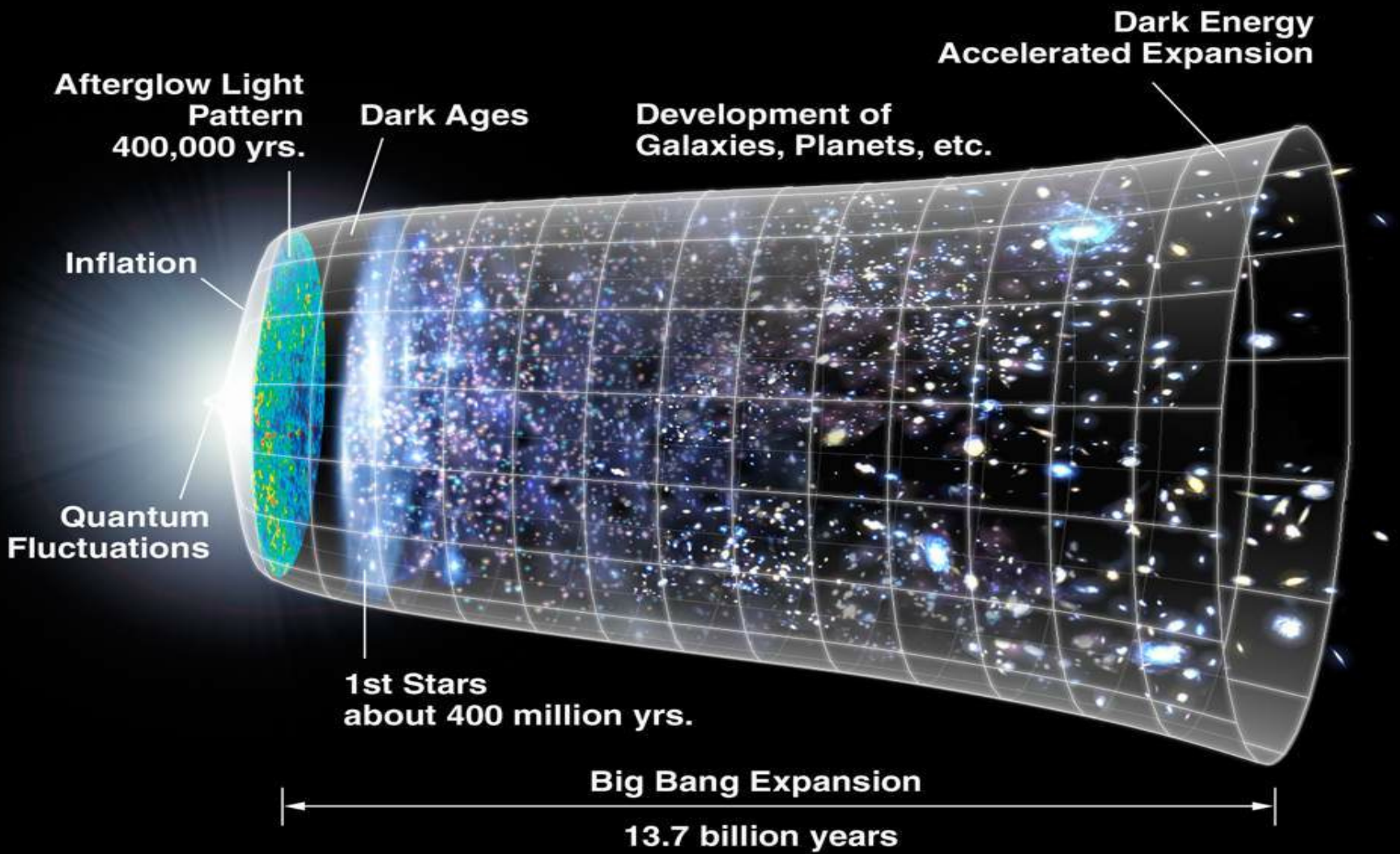

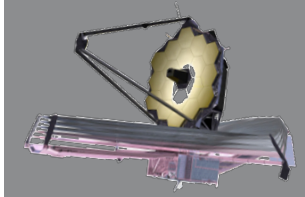

Kosmologie ist auch Statistik

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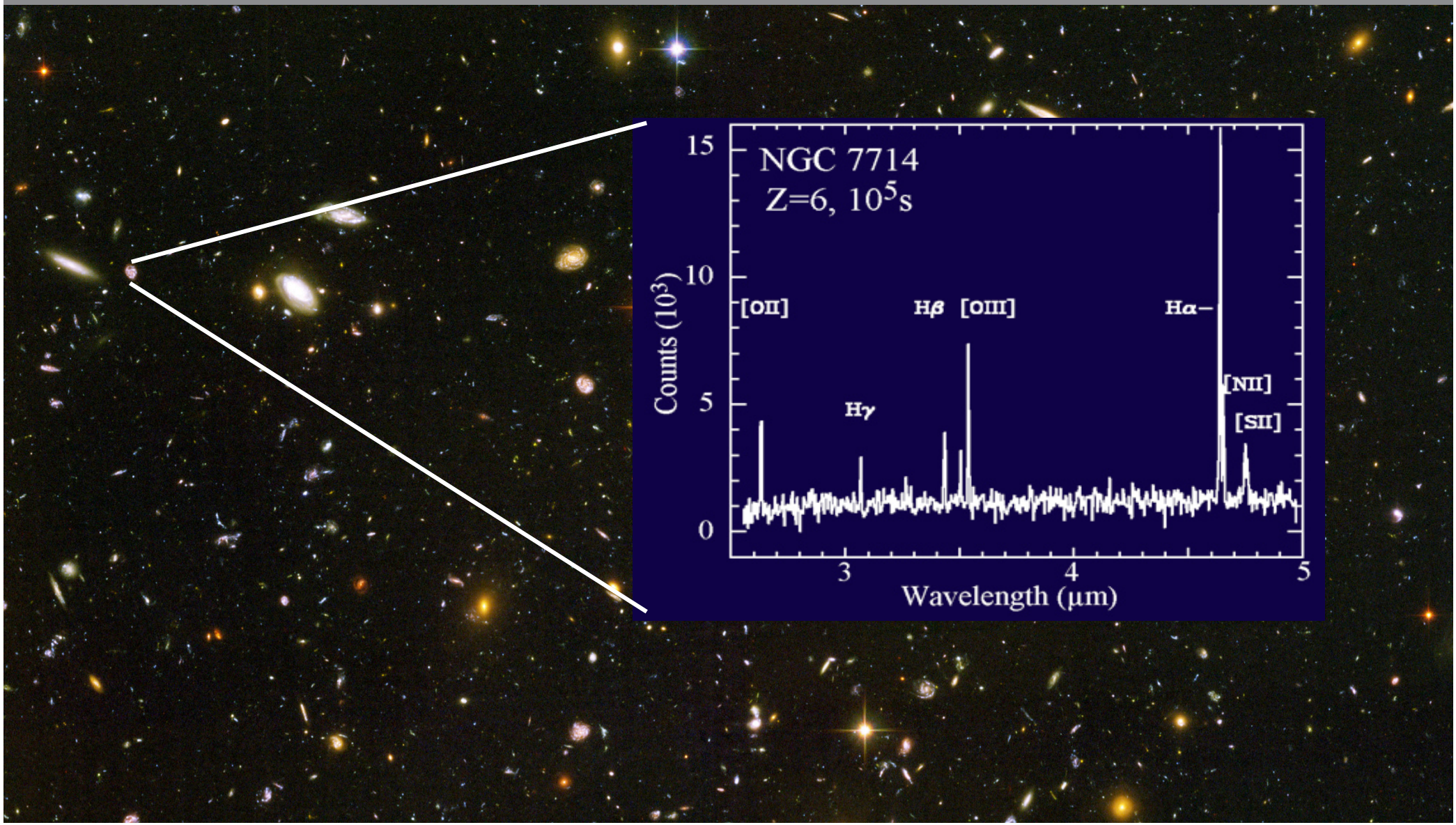
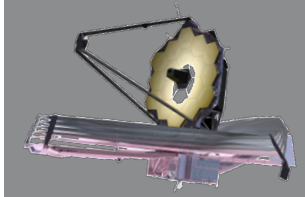
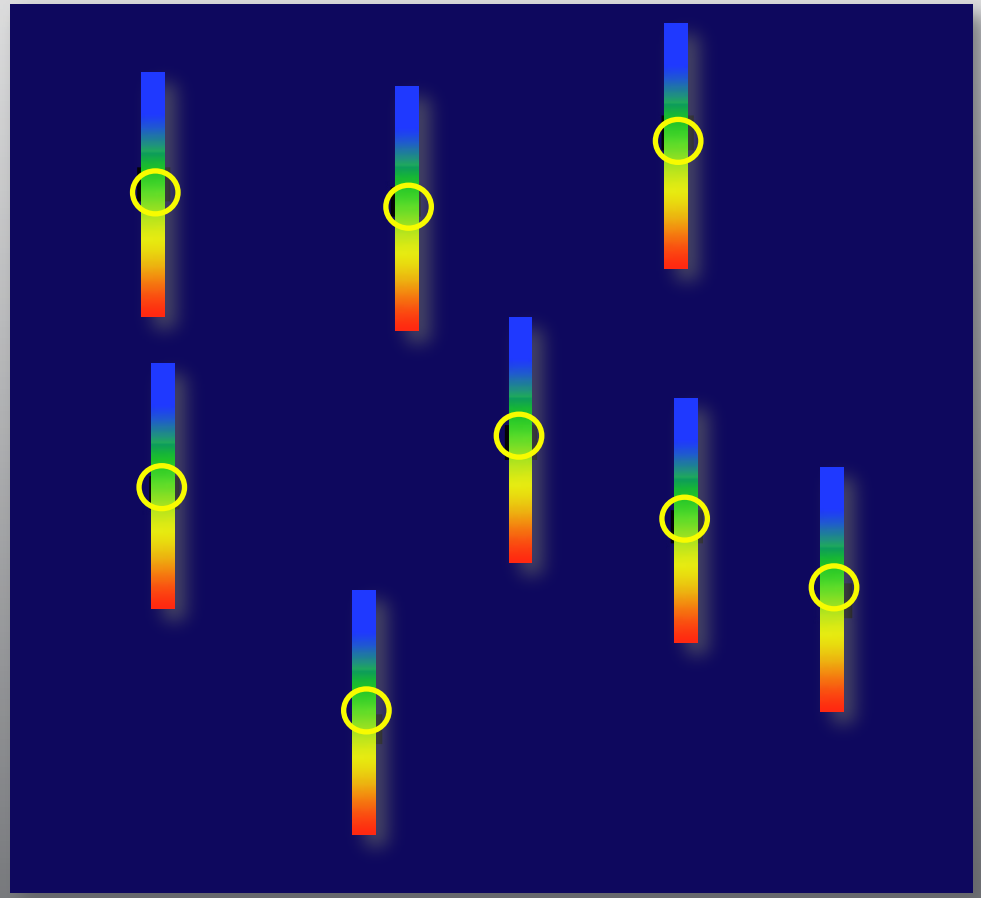
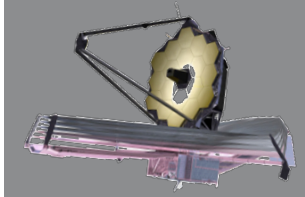




Multi-Objekt Spektroskopie

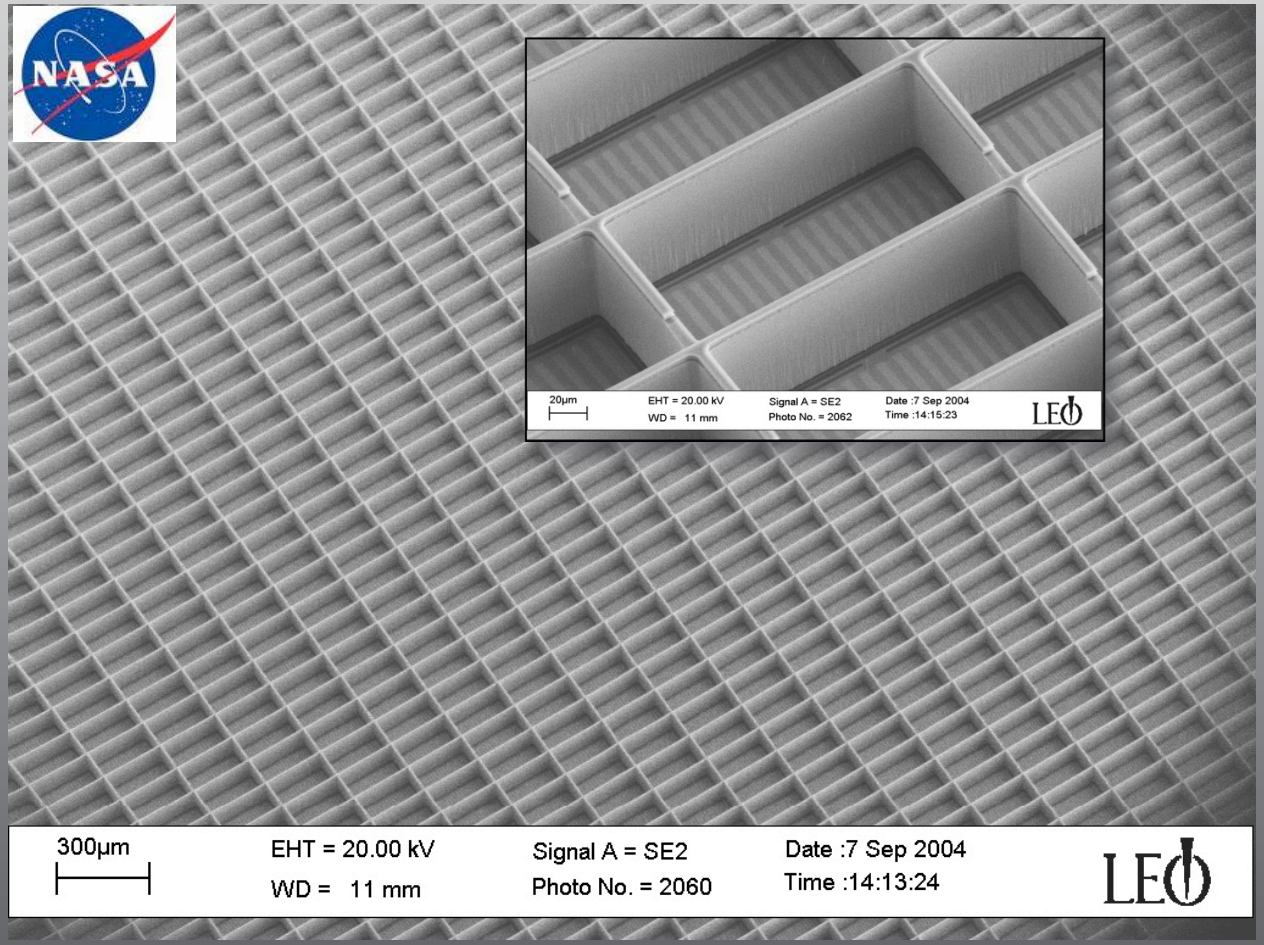


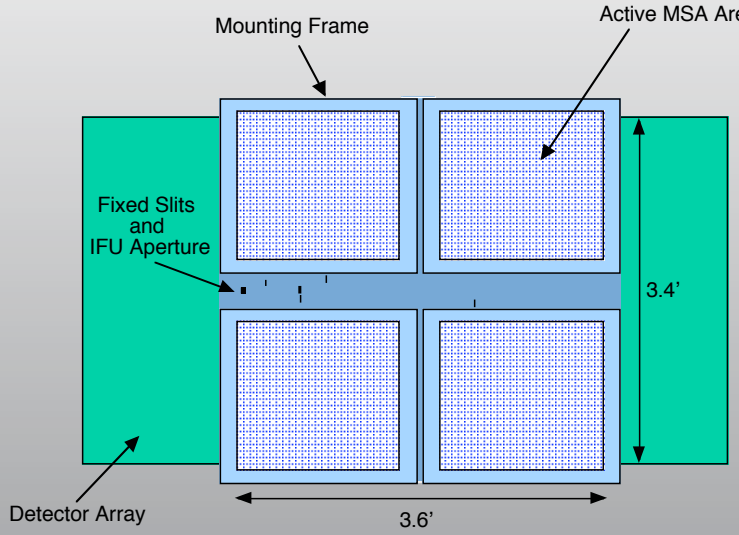
- Aufnahme des Himmels
- Wahl “interessanter” Objekte
- Ausblenden des restlichen Feldes
- Spektrale Aufweitung

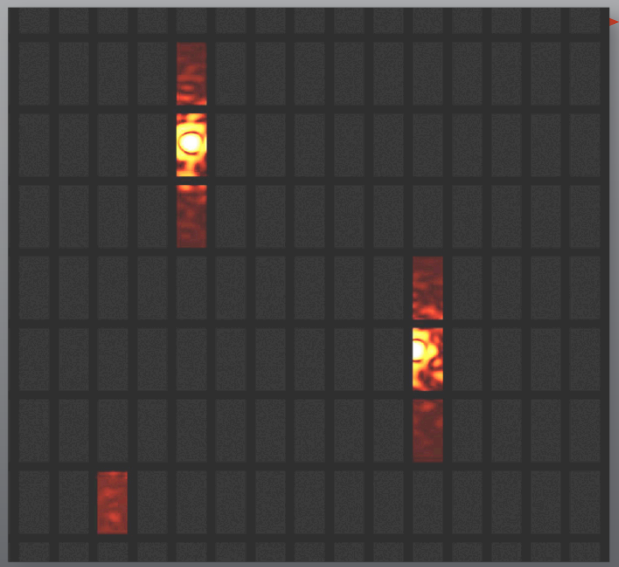


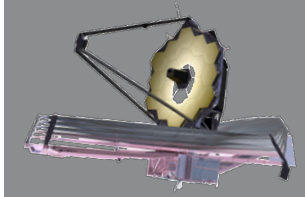
NIRSpec Mikrospalte

4x (365x171) einzeln ansteuerbare Spalte
bis zu ~100 Objekte gleichzeitig beobachtbar









NIRSpec – ein Mehrzweckinstrument

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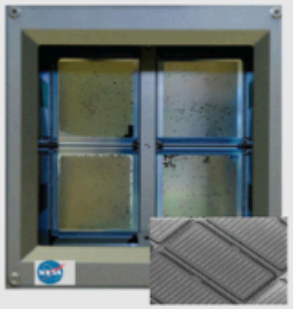
JWST/NIRSpec

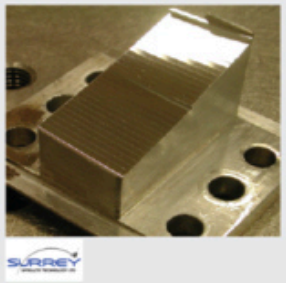
MOS



Multi-object spectroscopy with 0.2″-wide mini-slits.

- 9 square arcmin. field of view
- Low spectral resolution (30 to 300), prism-based mode covering the 0.6-5.0 micron range in one exposure.
- Medium spectral resolution (500 to 1300), grating-based mode covering the 0.7-5.0 range

IFU



IFU spectroscopy with a 0.1″ sampling.

(IFU made of 30 slices for a total of 900 "spaxels")

- 3″x3″ field of view
- Low spectral resolution (30 to 300), prism-based mode covering the 0.6-5.0 micron range in one exposure.
- Medium (500 to 1300) and high (1400-3600) spectral resolution modes, covering the 0.7-5.0 range in 4 exposures.
- IFU and MOS cannot be used at the same time.

SLIT

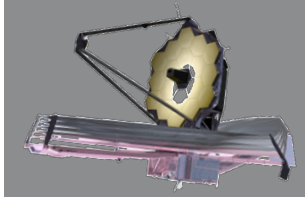
High-contrast slit spectroscopy.

(including with a 1.6″x1.6″ square aperture for extra-solar planet transit observation)

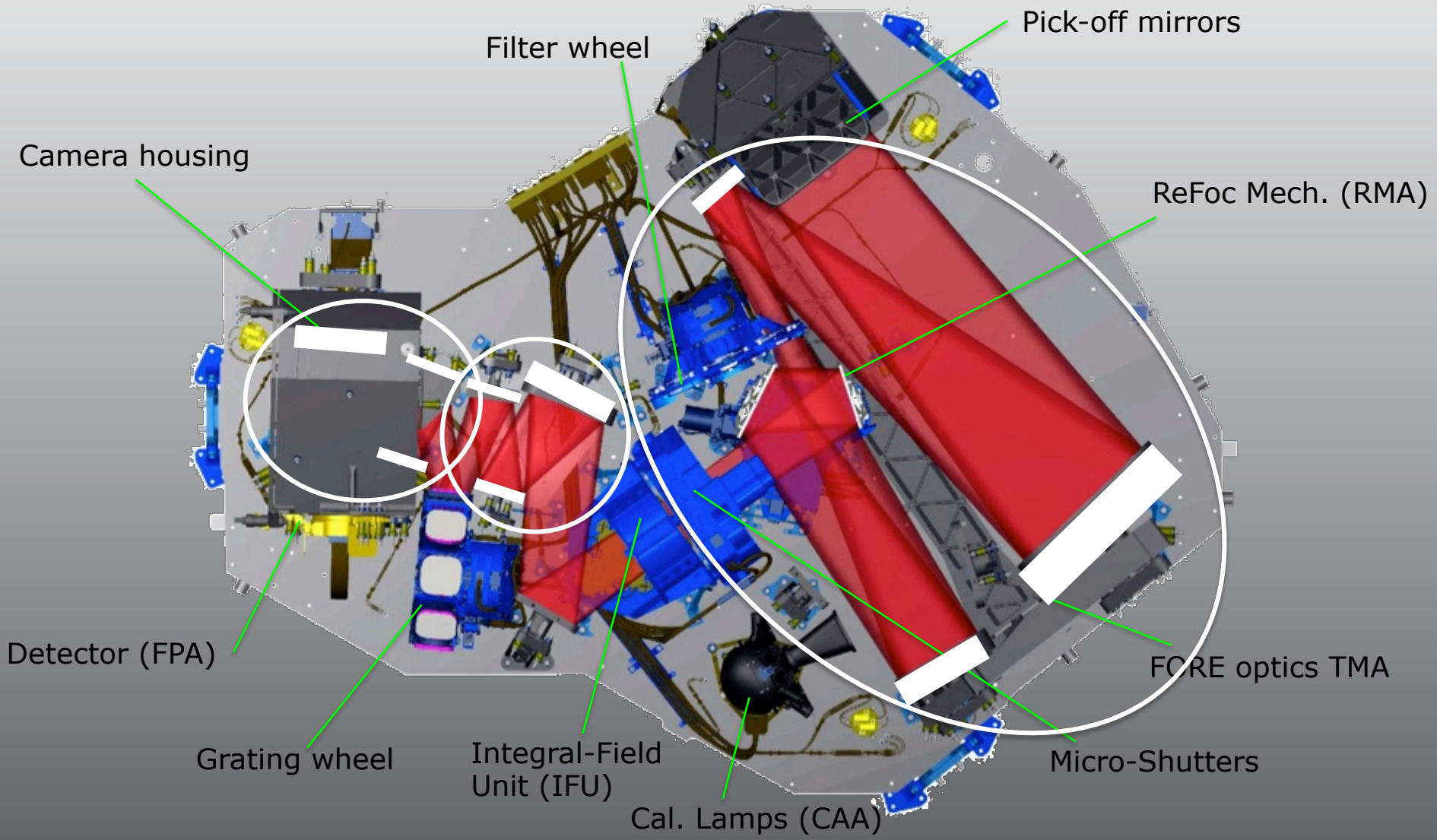
- 5 slits available

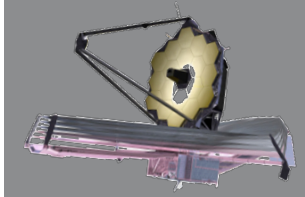
All spectral resolution modes available.

- SLIT can be used simultaneously to IFU or MOS.

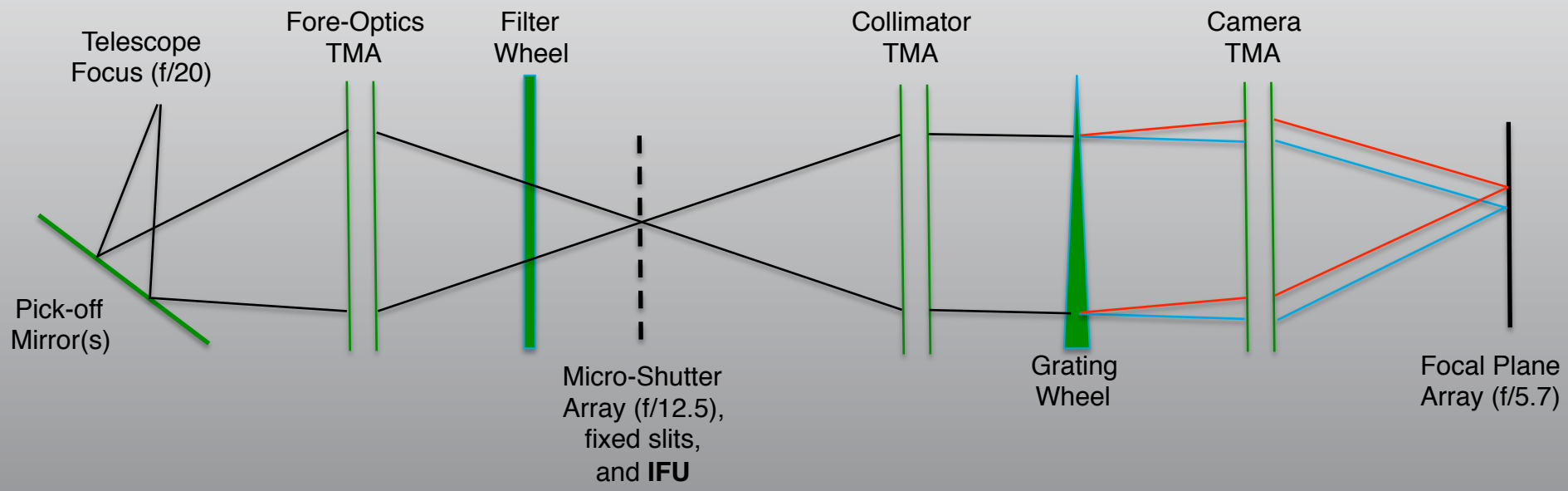


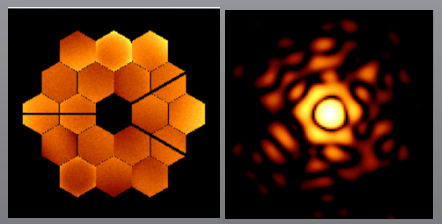
Mechanisches Design

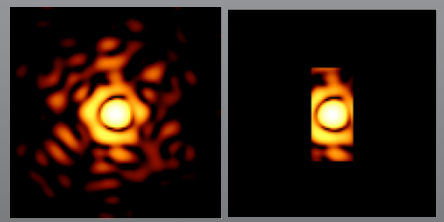


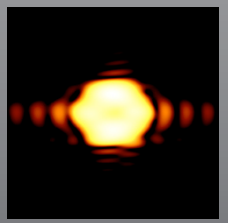


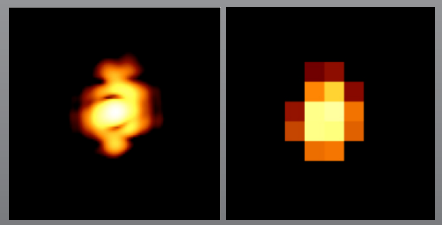
Optisches Design

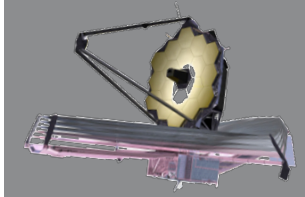



Telescope Focus


Slit Mask


Pupil at Disperser


Detector Array



NIRSpec Flight Model

esa

Fully assembled ISIM (March 2014)