

ANGULAR RESPONSE CHARACTERIZATION OF THE REXIS SOLAR X-RAY MONITOR (SXM)

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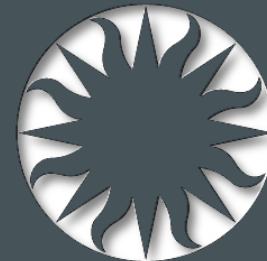
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ASTROPHYSICS

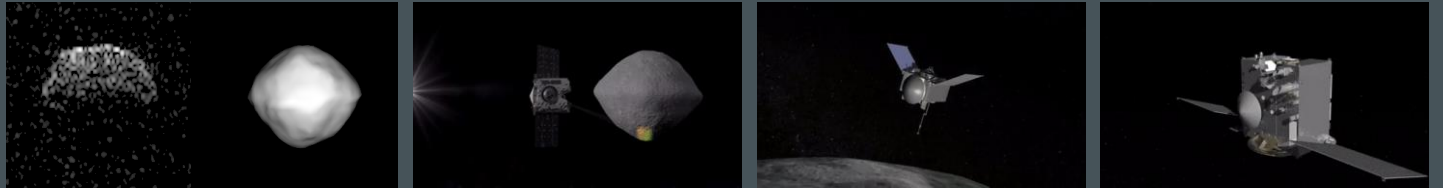


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OSIRIS-REX

ASTEROID SAMPLE RETURN MISSION



Credit: NASA Goddard Space Flight Center

- Launched on September 2016
- Will orbit the near-Earth asteroid 101955 Bennu
- Main objectives:
 - Map the surface of the asteroid
 - Elemental distribution
 - Classify Bennu among the different meteorite groups
 - Return a sample to Earth (2023)
 - Document the sample site



Credit: University of Arizona/Symeon Platt



Credit: NASA/Glenn Benson



Credit: NASA/Kim Shiflett

REXIS

REGOLITH X-RAY IMAGING SPECTROMETER

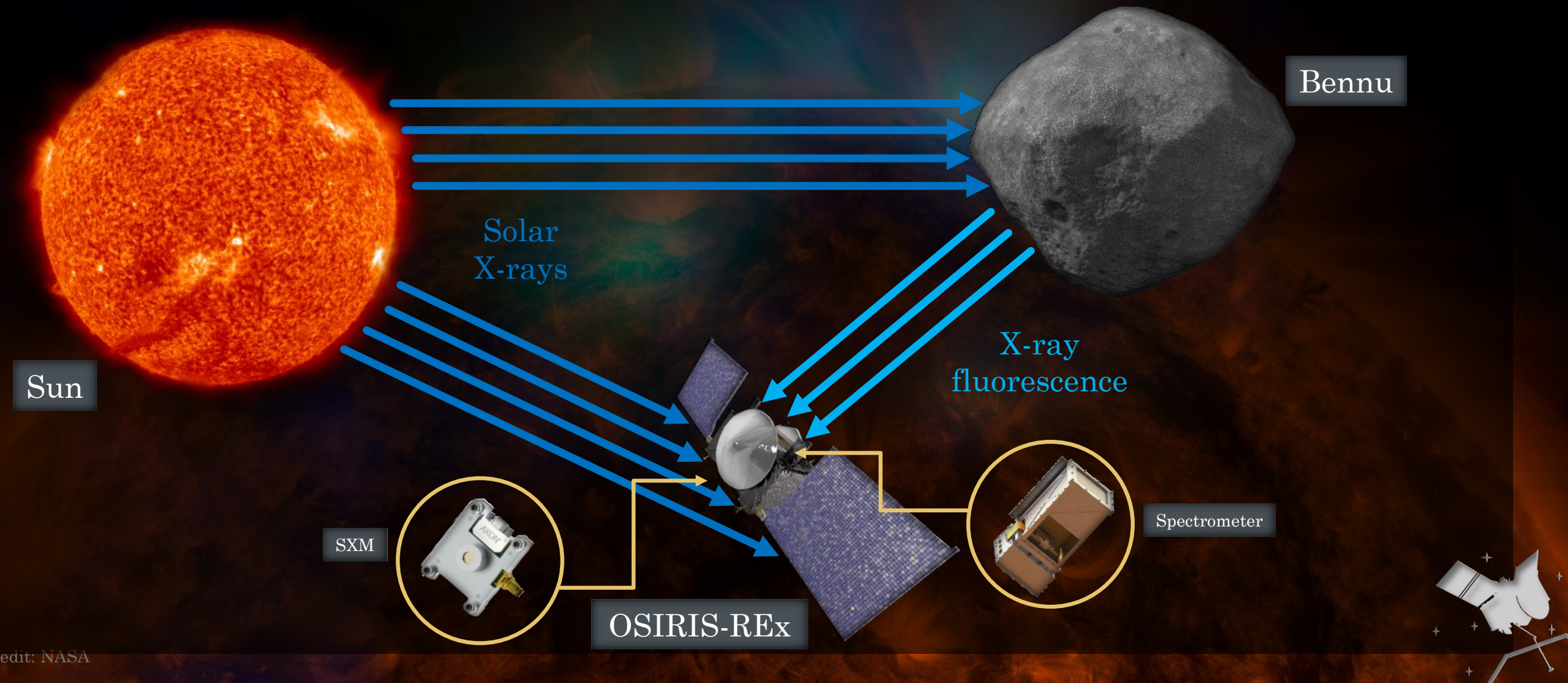


- Built by Harvard and MIT students
- Will determine the elemental composition
 - Abundance and distribution
- Two main components:
 - Main spectrometer
 - Solar X-ray Monitor



REXIS

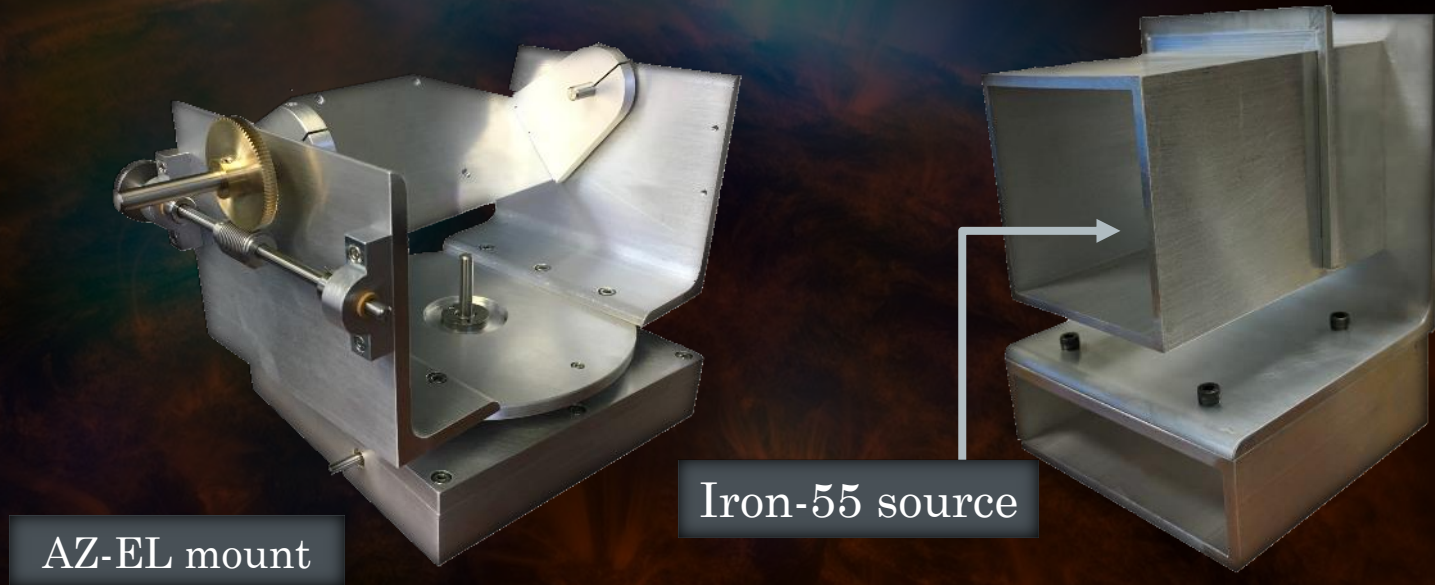
REGOLITH X-RAY IMAGING SPECTROMETER



SXM FLIGHT SPARE

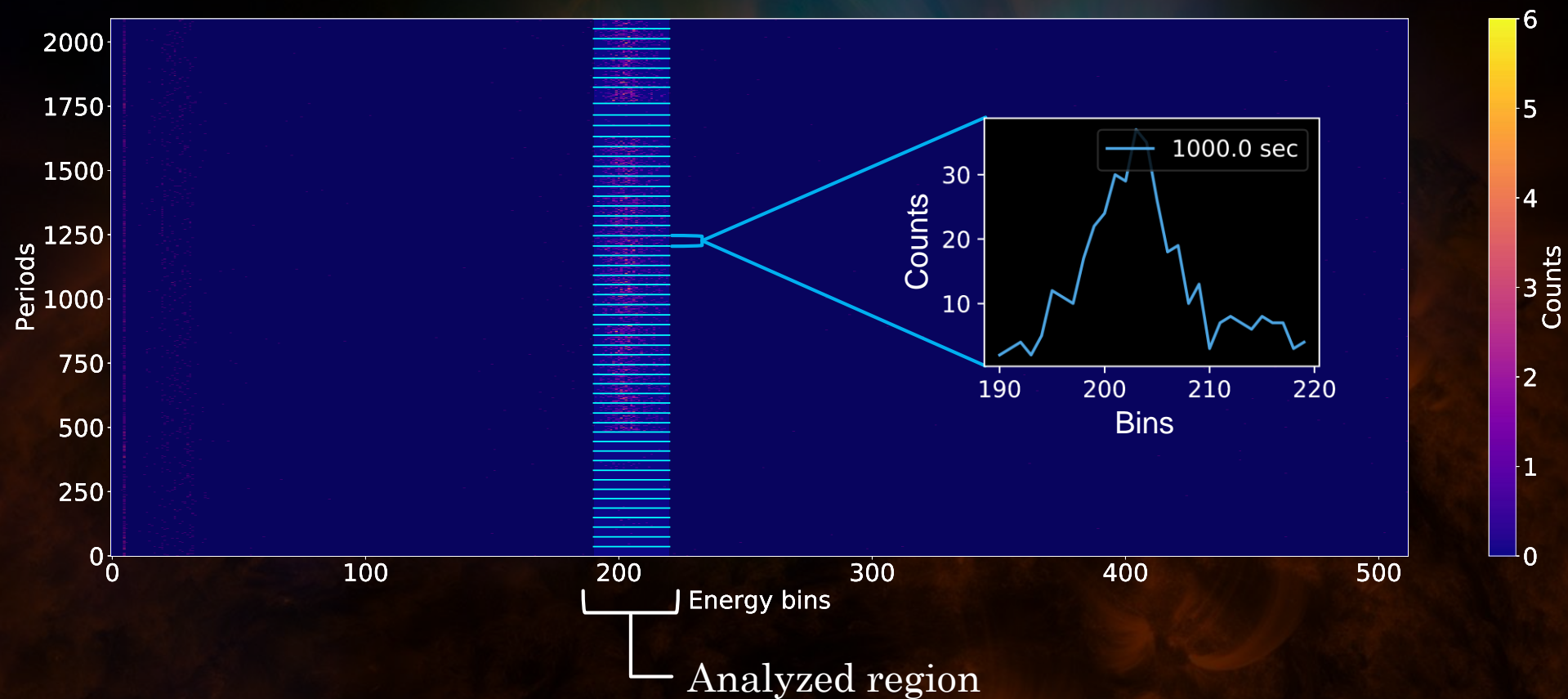
ANGULAR RESPONSE TEST - SETUP

- Count rate measurements at different angles
 - SXM on azimuth-elevation mount
 - Iron-55 source



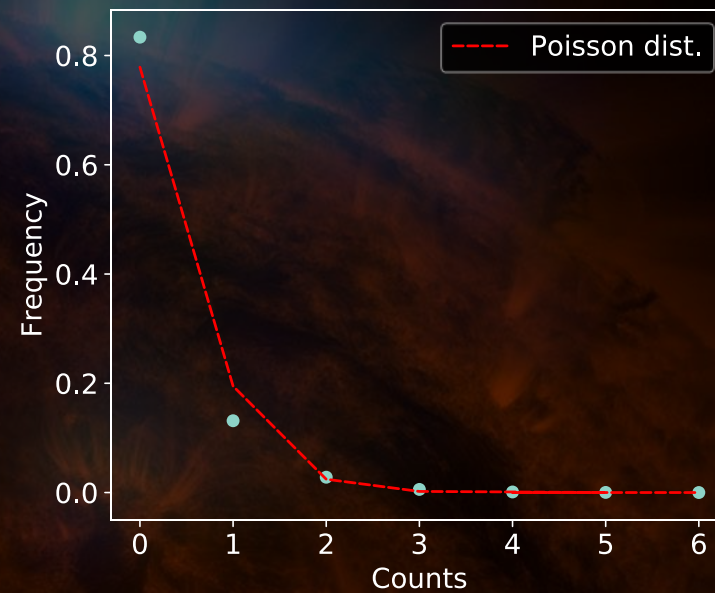
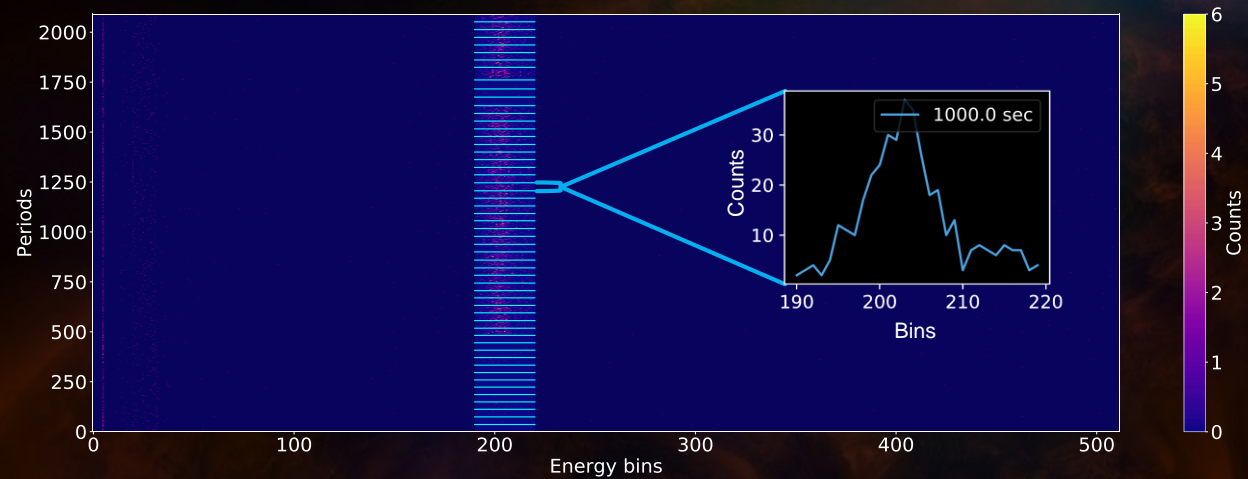
SXM FLIGHT SPARE

ANGULAR RESPONSE TEST - DATA



SXM FLIGHT SPARE

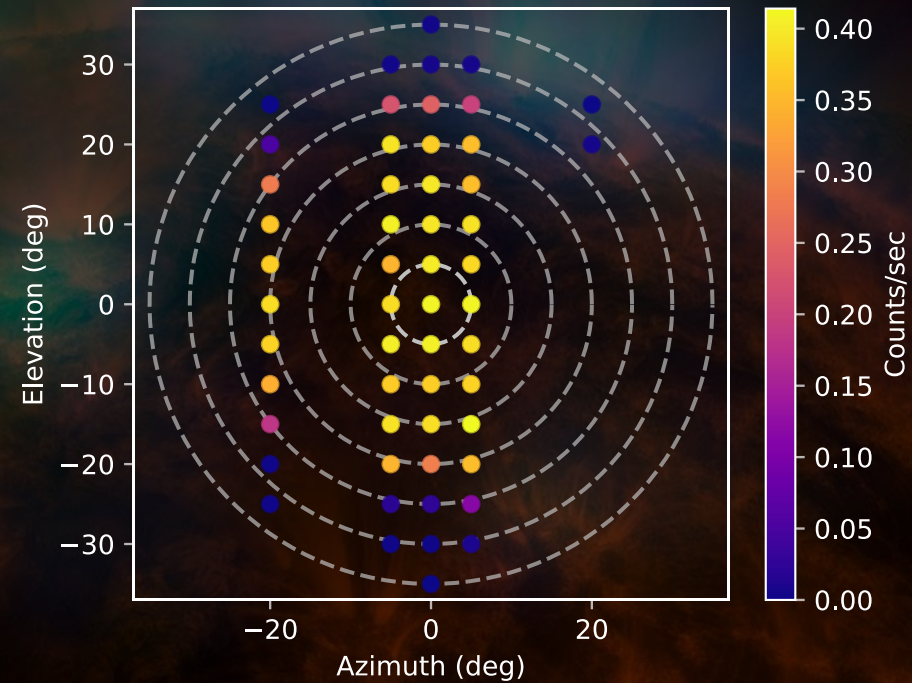
ANGULAR RESPONSE TEST - DATA



DATA ANALYSIS

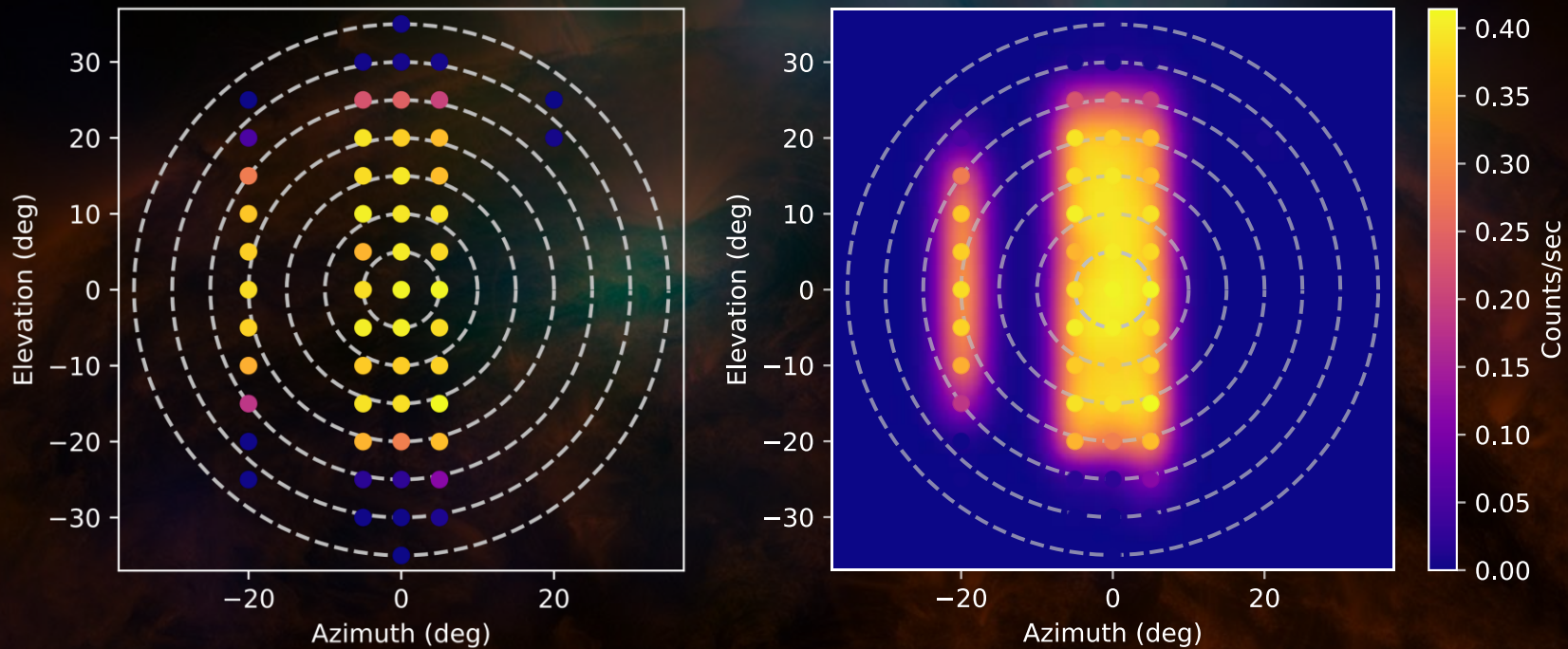
ANGULAR RESPONSE

Count rates on each measured
az-el coordinate on the FoV



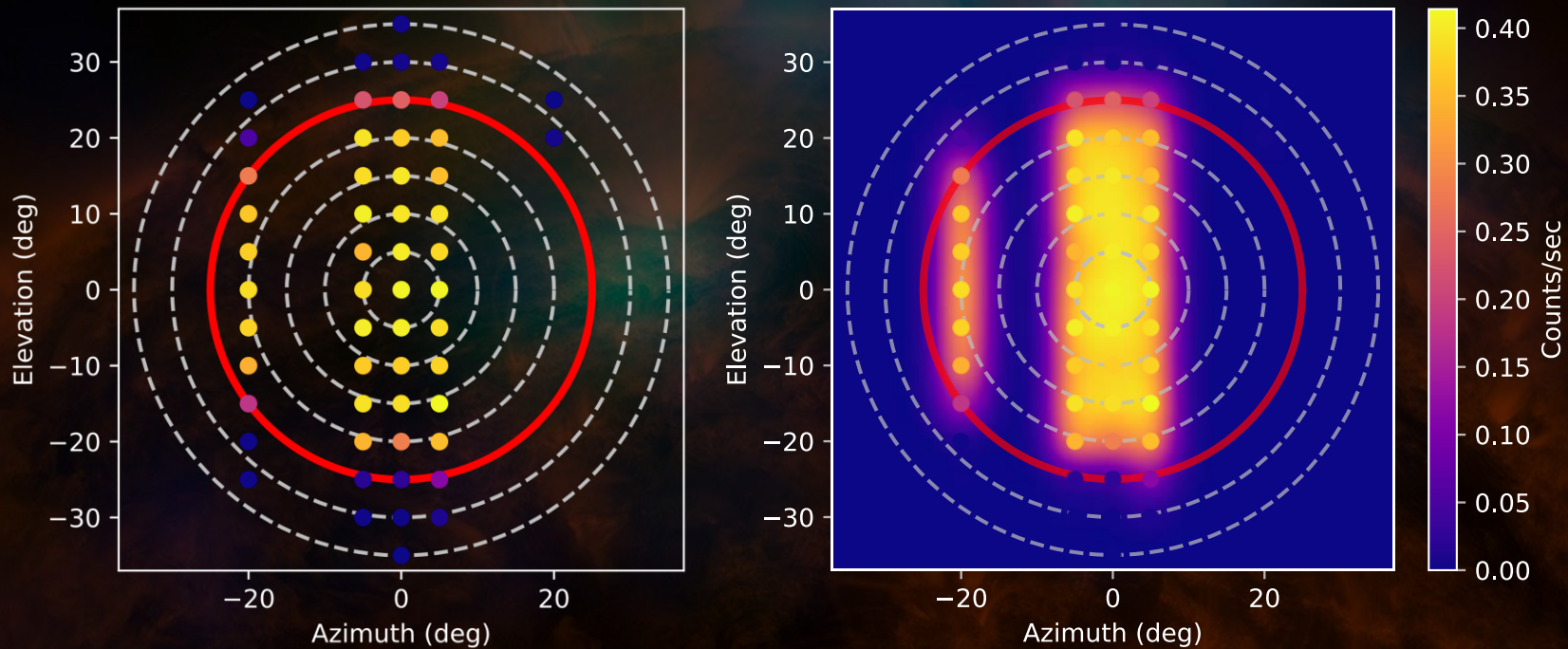
DATA ANALYSIS

ANGULAR RESPONSE



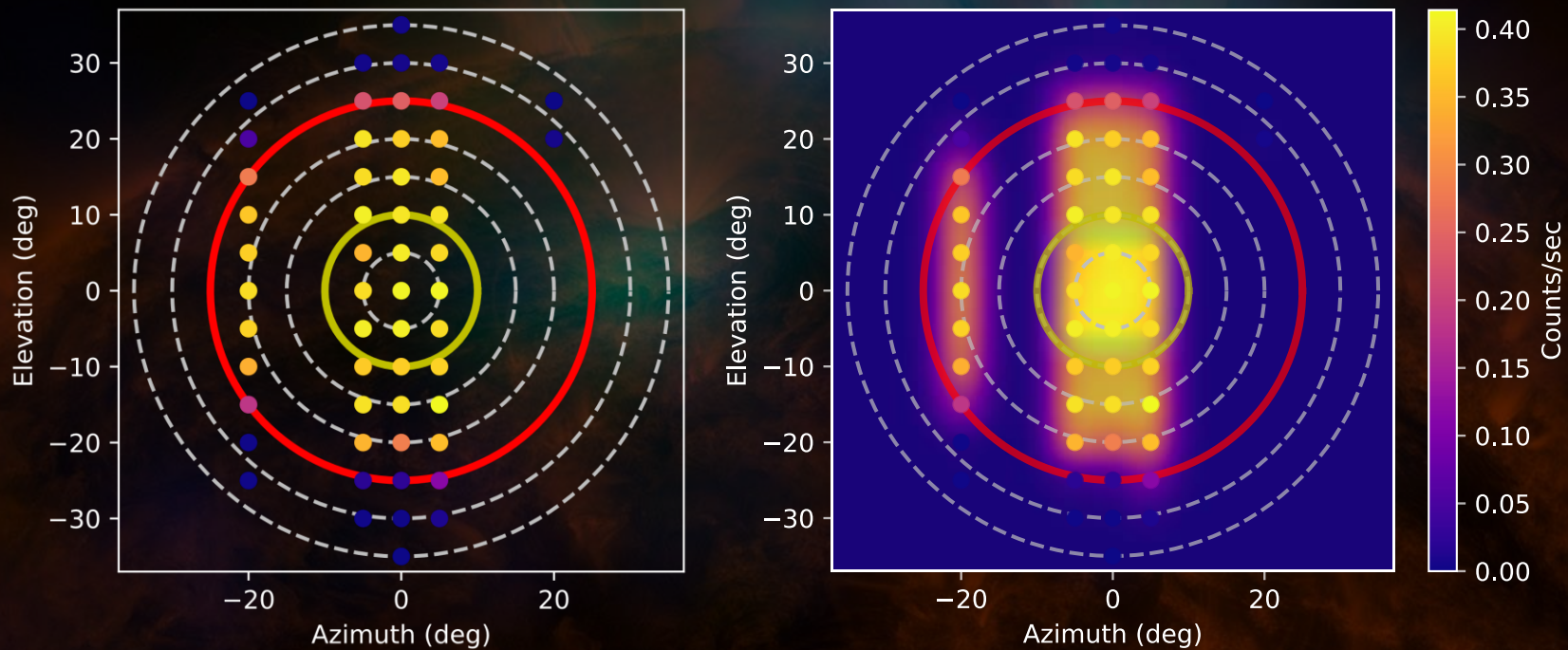
DATA ANALYSIS

ANGULAR RESPONSE



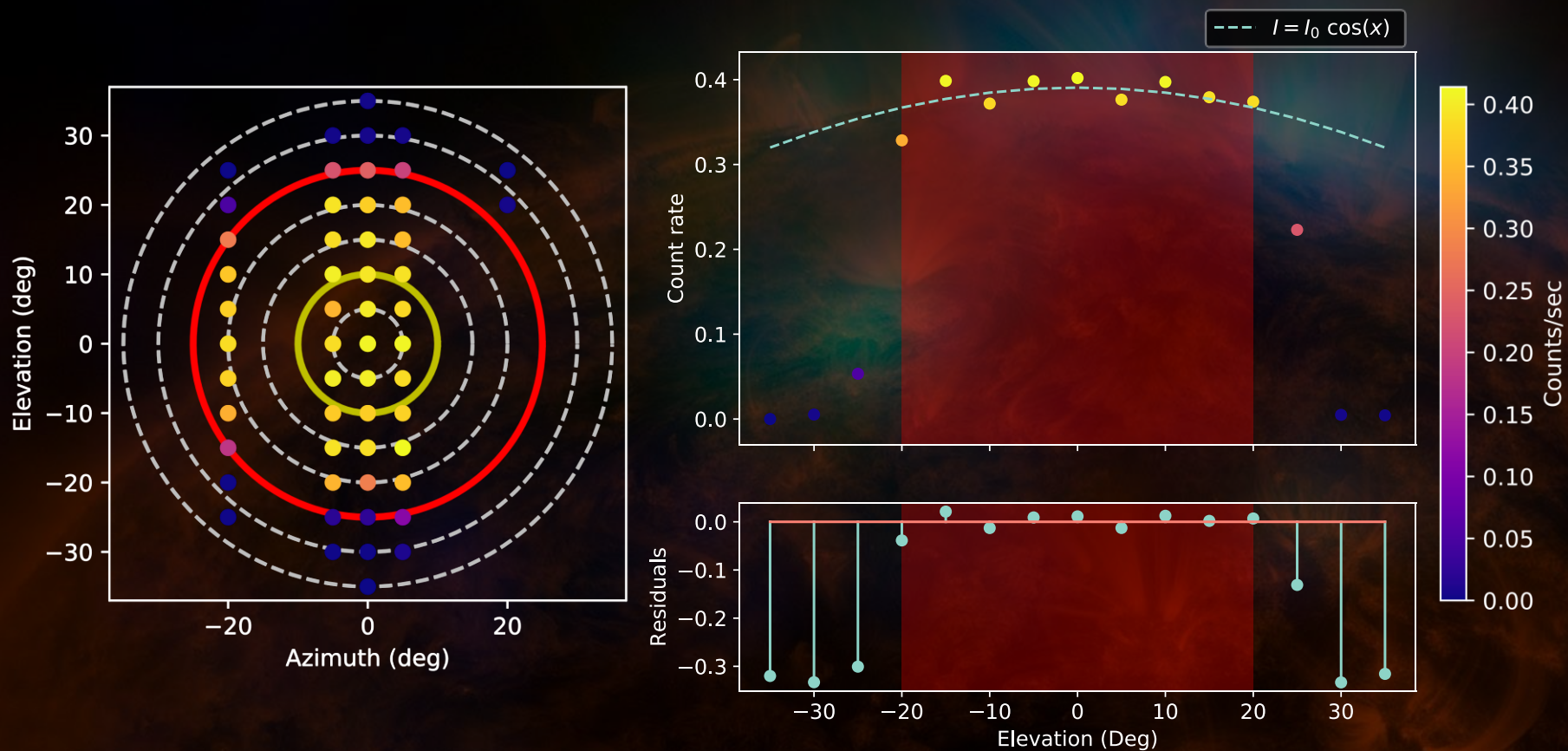
DATA ANALYSIS

ANGULAR RESPONSE



DATA ANALYSIS

ANGULAR RESPONSE



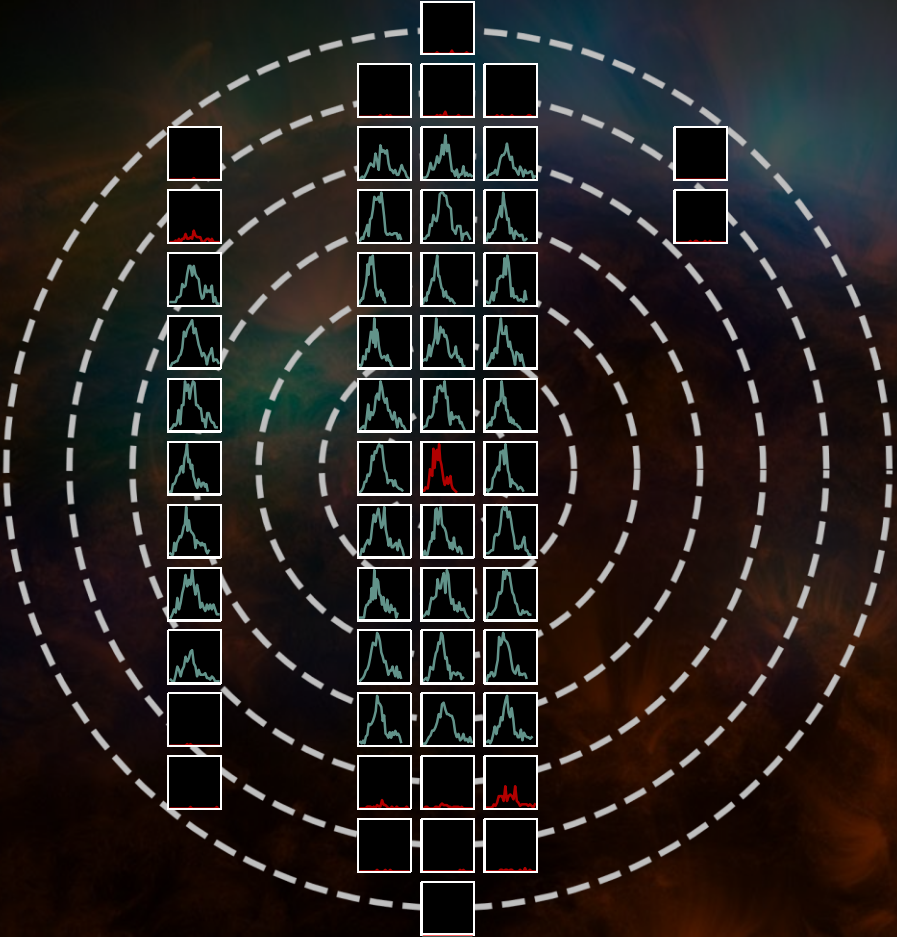
SXM
Collimator



Count rate decrease
within $20^\circ \approx 12.6\%$

DATA ANALYSIS

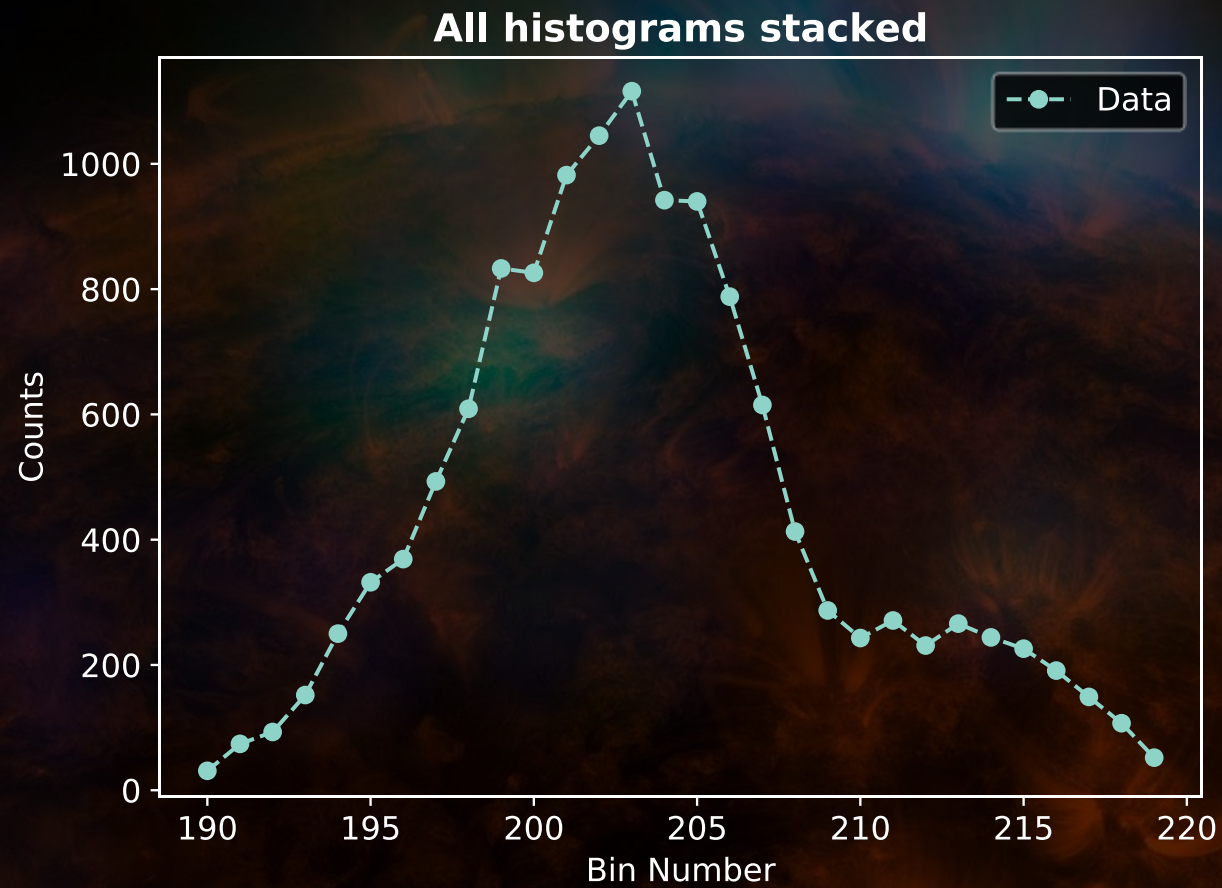
HISTOGRAMS



Histograms
Used ■
Not used ■

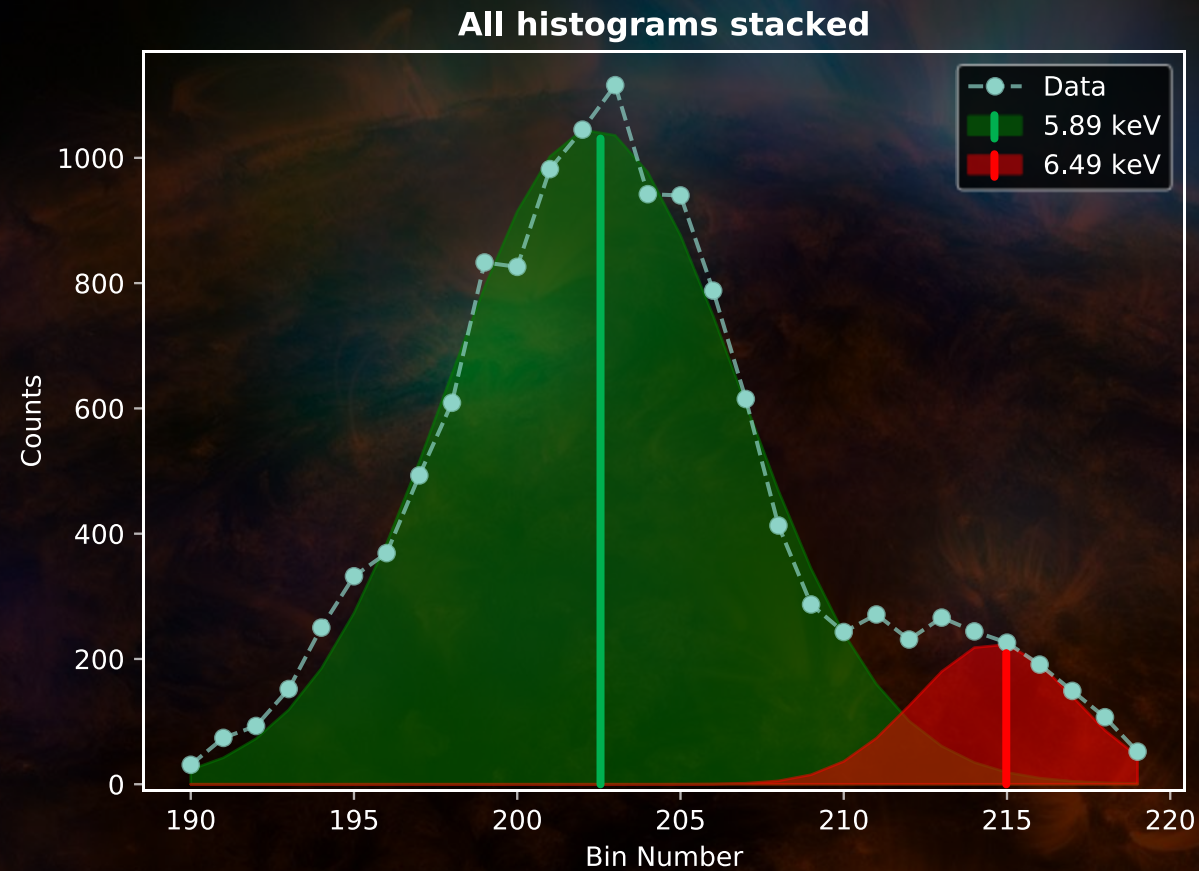
DATA ANALYSIS

HISTOGRAMS



DATA ANALYSIS

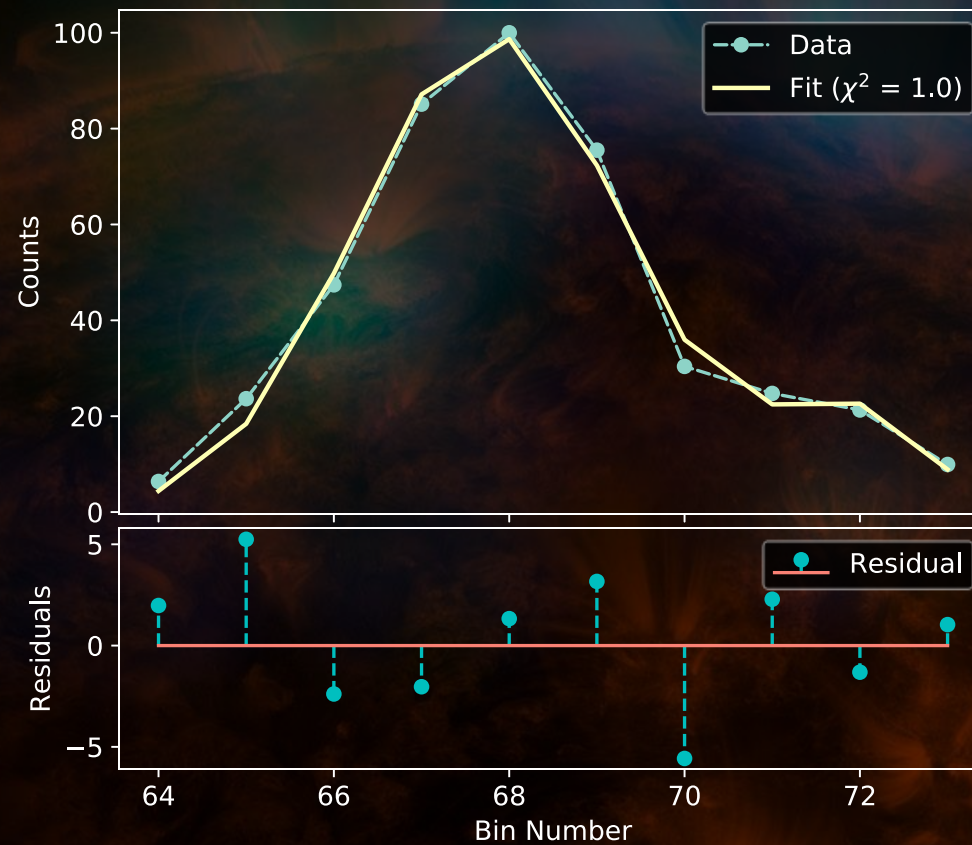
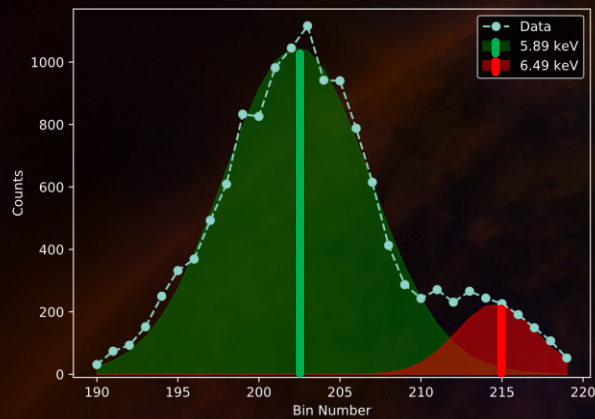
HISTOGRAMS



DATA ANALYSIS

HISTOGRAMS

All histograms stacked



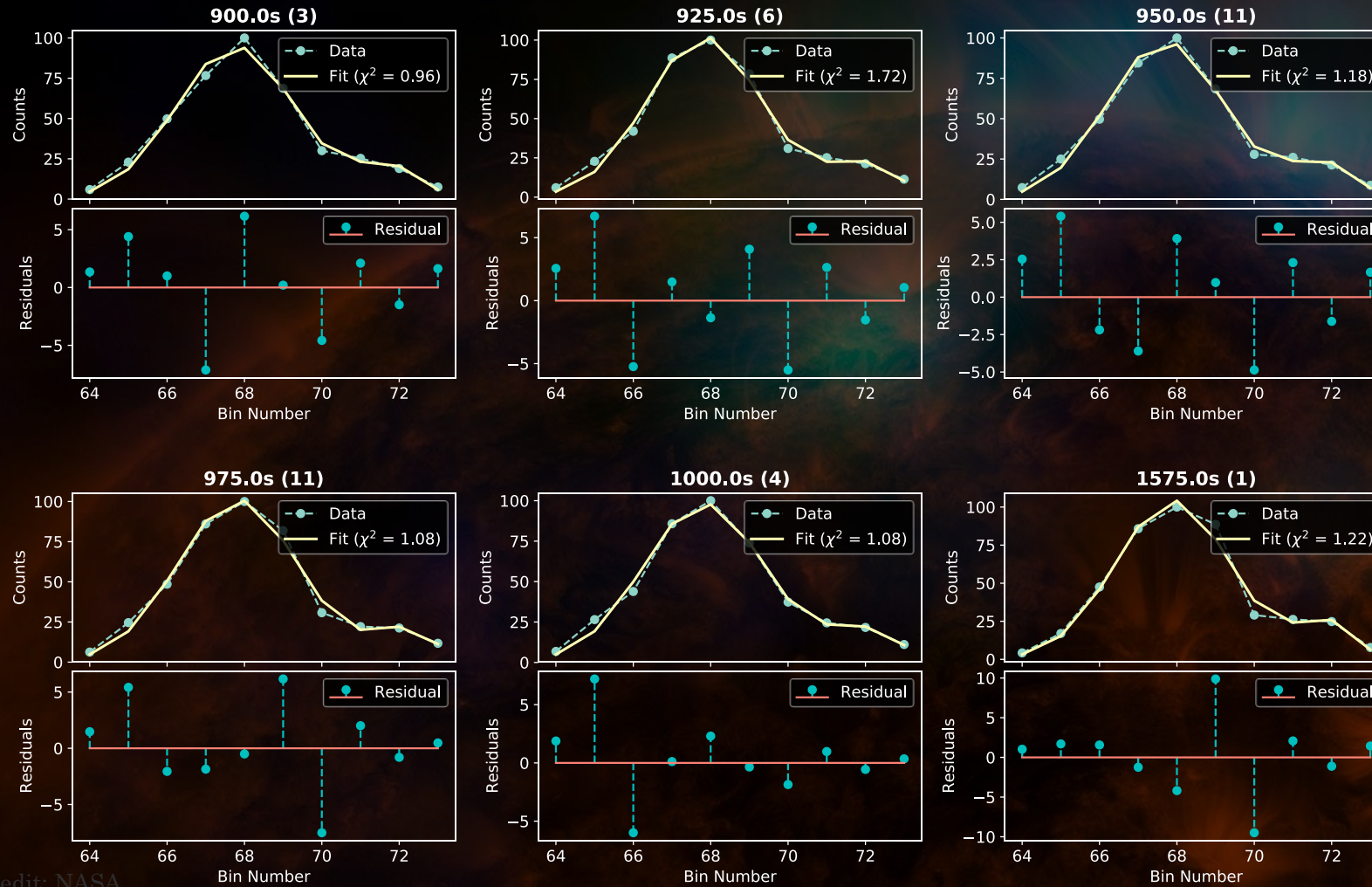
For analysis:

- Reduced number of bins
- Normalized counts



DATA ANALYSIS

HISTOGRAMS BY TOTAL INTEGRATION TIME



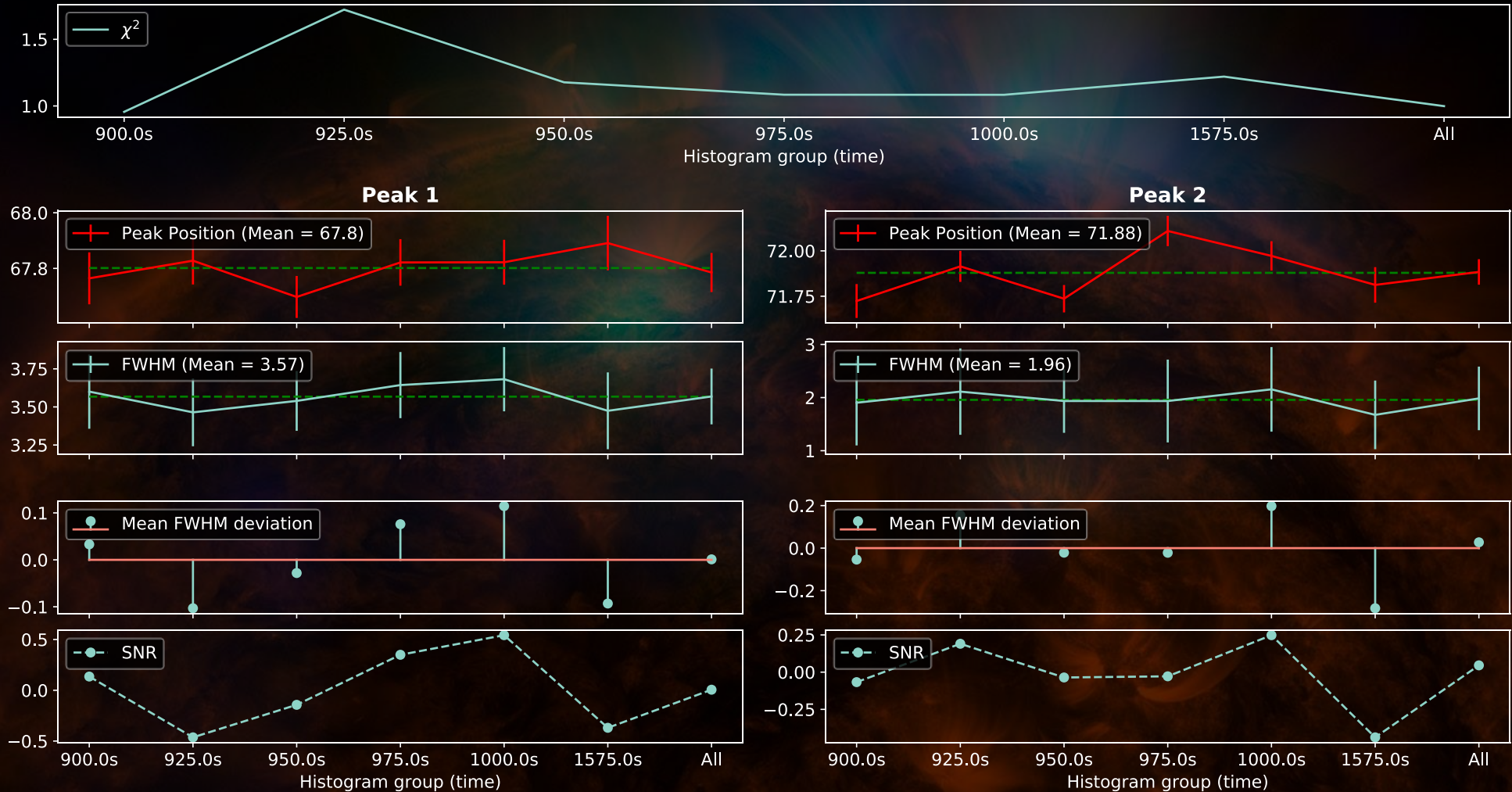
For analysis:

- Reduced number of bins
- Normalized counts
- Grouped histograms by integration time
- Check for variability



DATA ANALYSIS

EVOLUTION OF FIT PARAMETERS

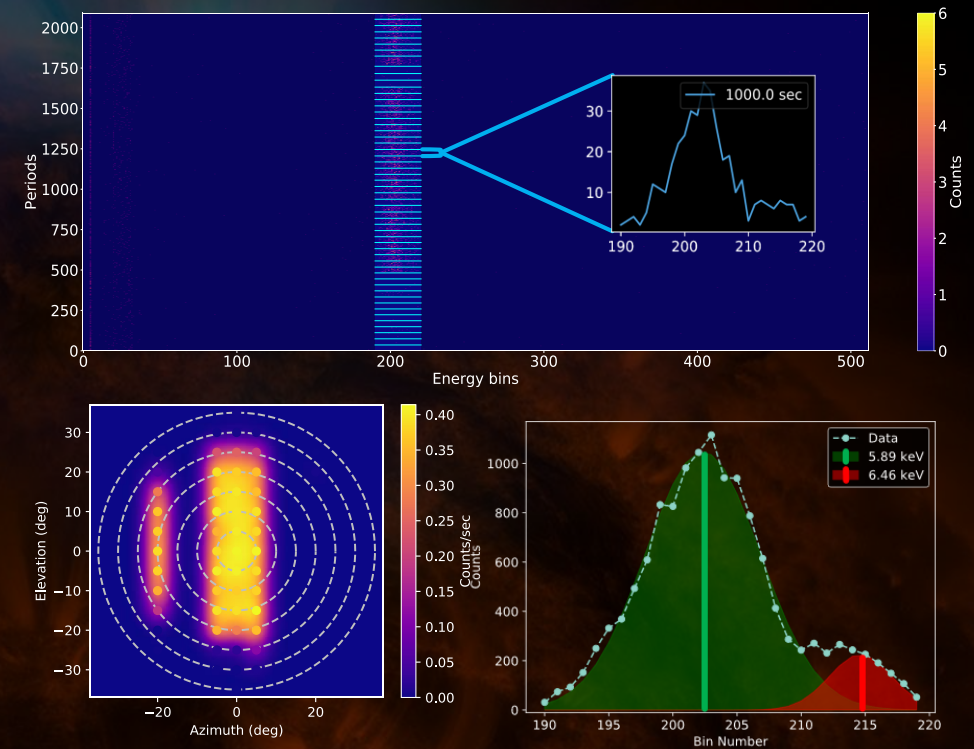


CONCLUSIONS

AND CONTRIBUTION TO REXIS

- Count rates within the FoV of the SXM remain generally stable
- No significant variability of resolution with respect to the integration times

The information obtained will be taken into consideration when implementing the SXM response function



ACKNOWLEDGEMENTS



Smithsonian

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