CAA Review of Roman Space Telescope Observing Philosophy

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Astro2020 Recommendation

Finding: The Roman Space Telescope remains both powerful and necessary for achieving the scientific goals set by New Worlds, New Horizons (Astro2010). It will carry out cosmological measurements complementing those of Euclid and Rubin Observatory, and Roman's microlensing survey will probe planetary occurrence over orbital separations not constrained by Kepler or TESS.

The planned imaging, spectroscopy, and microlensing surveys continue to be essential parts of Roman's mission, and a wealth of science will result from their data products, far beyond the measurement of Dark Energy parameters and exoplanet statistics.

Conclusion: The scientific landscape and the Roman Space Telescope's capabilities have changed significantly since it was first envisioned by New Worlds, New Horizons, and the currently planned balance of surveys and guest investigator-led observations may not be optimally suited to take advantage of new scientific opportunities.

Recommendation: NASA Astrophysics Division should hold a non-advocate review of the Roman Space Telescope's science program to set the appropriate mix of survey time devoted to the weak lensing, baryon acoustic oscillations, supernovae, and microlensing programs relative to guest investigator-led observing programs during the primary 5 year mission.

Philosophy

Roman will excel in producing large surveys in space and time

Roman data will be public immediately

Roman surveys should address multiple astrophysics science goals

At least three core community surveys will be defined in advance through open community processes

Additional general astrophysics surveys will be defined through solicited competitive and peer-reviewed processes

For core community surveys, neither ownership nor design should reside with any one person or group

Charge: The NASA Astrophysics Division would like advice from the CAA on the philosophy for setting the mix of survey times

Surveys

Core Community Surveys

- At least three surveys: High Latitude Wide Area Survey, High Latitude Time Doman Survey, Galactic Time Doman Survey
- Enable Astro2010 objectives in dark energy and exoplanet demographics plus many other astrophysics science goals
- Defined through open community processes, not by any one person or group
- Enhanced beyond requirements for Astro2010 objectives to enable broad astrophysics science goals

General Astrophysics Surveys

- Community proposed observations that are not part of the Core Community Surveys
- Address science that is not covered by the Core Community Survey, e.g., because not enough objects of interest covered by the Core Community Surveys
- Examples: Milky Way plane outside of the bulge region, local group galaxies, Magellanic clouds, Abell clusters, outer solar system objects

Question 1

Background: Current observing plan is to allocate 75% of prime mission observing time to 3 Core Community Surveys + 3 months of CGI observations and to allocate 25% to General Astrophysics Surveys proposed by the community.

Core community surveys will be decided by open community process to happen in 2022-2023 (details in the next talk)

Question: Should this community process

(1) Continue as is and maximize the utility of Core Community Surveys for general astrophysics science within the 75/25 split

(2) Focus the Core Community Surveys on cosmology and exoplanet requirements and optimize for shortest possible Core Community Surveys

(3) Relax the 75/25 split between Core Community Surveys and General Astrophysics Surveys to enable greater optimizations of the Core Community Surveys for general astrophysics science

Question 2

Background: Within General Astrophysics Surveys, the baseline plan allows for 30 selected proposals in 3 proposal cycles over 5 years of prime mission

Question: How should the Roman Project set the balance between the fractions of time allocated to large/medium/small General Astrophysics Surveys? How should the project set the overall number of General Astrophysics Surveys, when increasing the number of surveys comes at an increased cost to the mission?