Roman with Rubin

Steven Gough-Kelly and **Rachel Street** present a case for maximising the science return of major facilities

The Vera Rubin Observatory will be one of several flagship survey facilities beginning operations over the next decade alongside projects such as the Nancy Grace Roman Space Telescope. As part of the community call for input into the Roman Mission Core Community Surveys, an international team of researchers submitted a white paper demonstrating ways to maximise the science return of upcoming major facilities, with a particular focus on Rubin's and Roman's Milky Way Bulge Surveys.

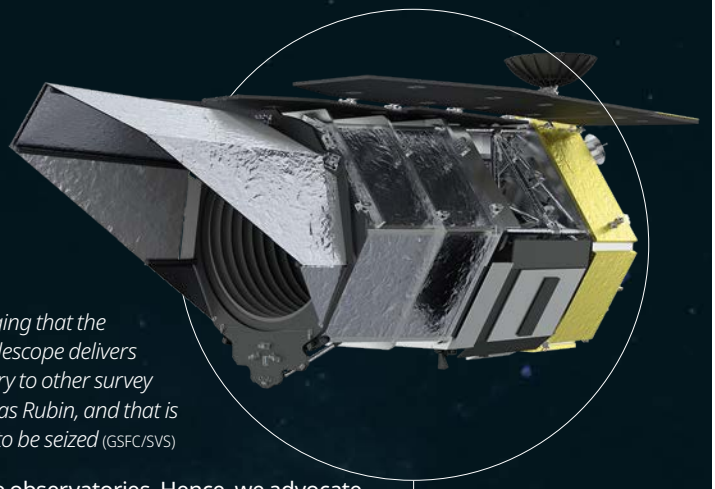
The deep near-infrared imaging that Roman will deliver will be highly complementary to the capabilities of other survey telescopes, such as Rubin, that will operate contemporaneously, particularly those facilities that can provide data at different wavelengths and messengers or different time intervals. Combining data from multiple facilities can provide critical astrophysical insights, provided the data acquisition is carefully scheduled and detailed plans are made for appropriate joint data analyses.

In the white paper, we discuss how Roman's characterisation of lensing events caused by exoplanets, stellar systems and stellar remnants can be enhanced by data from Rubin. The same combination of data will also be highly advantageous for the determination of stellar properties and for distinguishing exoplanetary transits. It will enable more accurate period-colour-luminosity relationships to be measured for variable stars throughout the Milky Way Bulge, probing structure and dynamics in the heart of the Milky Way. The combination of Roman's near-IR and Rubin's optical data will also be highly beneficial for high latitude surveys, for example, in the measurement of photometric redshifts of galaxies, characterising supernovae light curves and probing the edges of the Milky Way halo.

Within the white paper, the team could only present a sample of the full potential of coordinated efforts between these observatories. Hence, we advocate for a thorough study to be conducted as a joint effort between these major projects. We also recommend close coordination of the survey observing strategies, data handling and metrics of the next generation of great observatories and existing survey catalogues.

Furthermore, metrics designed to evaluate how changes in the strategy of one survey affect the scientific return of another should be implemented by observatories in developing their surveys, considering a wide range of complementary facilities and catalogues. It would also be valuable to have a common framework for writing and running survey strategy simulations and metrics rather than developing separate code bases for each facility. The Metric Analysis Framework (MAF, Rubin/LSST) is an example of a project-supported code base that has successfully integrated metric code contributed from the wider community.

We hope that readers will consult the white paper and support this case. The white paper can be found in full on arXiv, at: **arxiv.org/abs/2306.13792**



The kind of imaging that the Roman space telescope delivers is complementary to other survey telescopes such as Rubin, and that is an opportunity to be seized (GSFC/SVS)

AUTHORS

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The Vera Rubin Observatory at twilight in 2022 (Rubin Obs/NSF/AURA)