

# Roman Early-Definition Astrophysics Survey Option: Request for Information

## Abstract

The Roman Project is seeking community input on the option to *pre-select* one Astrophysics Survey nominally to be executed within the first two years of the Nancy Grace Roman Space Telescope (hereafter “Roman”) mission, and using up to ~700 hours of wall clock time. This would be in addition to the Core Community Surveys already being planned for the mission, and would be part of the overall time set aside for General Astrophysics Surveys. The survey and the investigations it enables must be scientifically compelling, and be significantly enhanced by specific preparatory activities that are enabled by early selection and definition. Opinions and survey concepts for consideration are solicited by **TBD**, 2021, 8PM EDT.

## Context

Roman is a NASA Astrophysics Observatory featuring a wide-field 2.4m near-infrared-optimized telescope equipped with capable camera, the Wide-Field Instrument, to be launched around 2026. Overview descriptions of the Roman Observatory are provided in, e.g., [Akeson et al. \(2019\)](#) and [Spiegel et al. \(2015\)](#); links to further information are provided at the end of this document. Roman will execute three “Core Community Surveys”: a High-Latitude Wide-Area Survey, a High-Latitude Time Domain Survey, and a Galactic Bulge Time Domain Survey. These surveys are targeted at answering specific questions on dark energy and exoplanet demographics, but the resulting datasets will also enable investigations on a broad array of other subjects. In addition, one quarter of the prime mission time (1.25 years out of the first 5-years) is set aside for other “Astrophysics Surveys” yet to be defined. Solicitations for peer-reviewed proposals for Astrophysics Surveys and support for science investigations will commence about one year prior to launch. All Roman observations will be publicly available with no period of limited access.

The Roman Project is considering the option to *pre-select* in the near-term one Astrophysics Survey using the Wide Field Instrument to be executed within the first two years of the Roman mission, and using up to ~700 hours of wall clock time (i.e., the equivalent of one full month). This is motivated by the understanding that some projects may benefit significantly from being selected early, so as to enable multi-year preparatory activities that can enhance the value of the survey and its data products. *If a sufficiently compelling survey is identified that materially benefits from early selection*, it may be selected to be part of the overall time set aside for Astrophysics Surveys. Alternatively, if no such survey is identified, then the baseline remains for all Astrophysics Surveys to be selected as part of the regular peer reviewed proposal calls.

Through this Request for Information (RfI), the Roman Project asks the astronomical community to: (a) comment/advise on whether or not to pre-select any Astrophysics Survey; and (b) to outline and submit survey concepts that would demonstrably benefit from selection as an Early-Definition Astrophysics Survey. The purpose of this RfI is to establish whether to proceed with

and to define the driving science themes for an Early-Definition Astrophysics survey. We welcome inputs on any possible survey concepts.

The Roman Project will compose an Assessment Committee to review the responses to this RfI and assess them against the specific criteria outlined below. The Committee shall provide an assessment on whether or not to proceed with specifying a Roman Early-Definition Astrophysics Survey, and if so, what survey concept to proceed with. As part of making that assessment, the Committee may choose to request additional scientific or technical details on one or more of the proposed survey concepts. The committee shall write a brief report, to be made public, providing the motivation for its findings. The NASA Roman Project Scientist will make the final decision to accept, reject, or amend the findings, and may request input from additional groups or individuals before doing so.

If any Roman Early-Definition Astrophysics Survey concept is selected, then ***full survey specifics and detailed observational strategies would be defined through a future community process***. This survey will not be assigned or allocated to a particular team. Funding for the community to participate in specific preparatory activities, data analysis, scientific exploitation, and/or coordination activities with other facilities, would be made available by NASA through future Roman funding opportunities.

### **Criteria**

The primary threshold criterion for any survey concept to be considered as part of this assessment for early definition is:

- The science enabled by the proposed survey must be *significantly enhanced by specific preparatory activities that are enabled by early selection and definition* of the proposed survey concept. These may include, e.g., supporting facility observations, software development work, theoretical/simulation efforts, etc. This must present an opportunity that would otherwise be lost by waiting until the first Call for Proposals and subsequent competitive peer review.

Moreover, the proposed survey concept must address the following criteria for science merit:

- The investigations enabled by the proposed survey must yield significant scientific advancements, commensurate with the allocation of up to one month of observing time on a major NASA Observatory.
- The proposed survey concept must exploit the unique observational capabilities of Roman, and must be beyond the capabilities of the ground-based and space-based datasets expected to be available at the time of Roman launch.
- The proposed survey concept must be distinct in design from the Core Community Surveys that Roman will conduct, and must enable science investigations that will not already be possible with the Core Community Survey data.

- The proposed survey concept should create datasets that will allow a broad segment of the astronomical community to pursue a wide range of investigations across range of subject areas.

Respondents who propose a survey concept must describe how well their concept addresses all the above criteria. Respondents should have no expectation of privacy to the submission of the survey concept and how it meets the above criteria, as any concept may be detailed in the public assessment made by the Assessment Committee.

### **Submission Instructions**

To submit a response to this RfI, please follow the template provided at <http://TBD/>. You may use the MS Word template provided, or any other software for editing your responses (12pt font). Once finished, please create and email a pdf file to [tdb@TBD.edu](mailto:tdb@TBD.edu).

The deadline for submissions is **TBD**, 2021, 8PM EDT.

### **Roman Mission Supporting/Background Information**

For further information on Roman, please consult any of the sources listed below. For specific questions related to a submission, email both [help@stsci.edu](mailto:help@stsci.edu) and [roman-help@ipac.caltech.edu](mailto:roman-help@ipac.caltech.edu), with subject line: “Roman Early-Definition Astrophysics Survey question”.

- Roman Project websites
  - at [GSFC](#)
  - at [STScI](#)
  - at [IPAC](#)
- Roman Overview papers
  - [100 Hubbles for the 2020s \(Akeson et al. 2019\)](#)
  - [2015 Report by the Science Definition Team \(Spergel et al. 2015\)](#)
- Roman Fact Sheets
  - [Mission & Capabilities Overview](#)
  - [Surveying the Sky](#)
  - [Stars by the Billions](#)
  - [Galaxies by the Millions](#)
  - [Cosmology](#)
- Roman Science
  - [Selection of Roman-related ASTRO2020 decadal survey white papers](#)
  - [List of Roman-related science papers](#)
- Roman Capabilities
  - [Observing modes and sensitivities](#)

- Survey yields per month of on-sky time, including slew+settle overheads: see Tables 1 and 2 of [Akeson et al. \(2019\)](#)
- [Detailed Technical Reference Information](#)
- Roman Simulation and Exposure Time Tools
  - [STScI Roman Science Planning Toolbox](#)
  - [IPAC Roman Simulation Repository](#)