

# Proposal for an HWO Planet Formation SAG

Meredith MacGregor and Briley Lewis

# Solar Systems in Context (SSiC)



Evgenya Shkolnik (Arizona State)  
Tyler Robinson (U Arizona)



Characterizing Exoplanets  
Renyu Hu (JPL)  
Michiel Min (SRON)

Solar System Observations  
Lynnae Quick (GSFC)  
Richard Cartwright (JHU/APL)

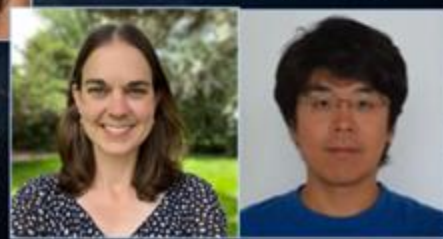


Demographics & Architectures  
Jessie Christiansen (IPAC)  
Malena Rice (Yale)



Ex Officio  
Courtney Dressing  
(Berkeley)

Birth & Evolution  
Meredith MacGregor (JHU)  
Yasuhiro Hasegawa (JPL)



Solar System  
Observations

The Case for Venus

Mars Origins

Ocean World Habitability

Solar System Origins

Exoplanet Surface Liquid Water

Rocky Worlds vs Sub-Neptunes

Characterizing  
Exoplanets

Atmospheric Escape of Small Exoplanets

Reflected Light Spec. of Giant Exoplanets

Transiting Exoplanets

Identify Cold Ocean Worlds

Identify Venus-like Exoplanets

Birth & Evolution

Habitability in Planetary System Context

Protoplanets and Protoplanetary Disks

Debris Disks and their Properties

Disk Winds and Dispersal of Protoplanetary Disks

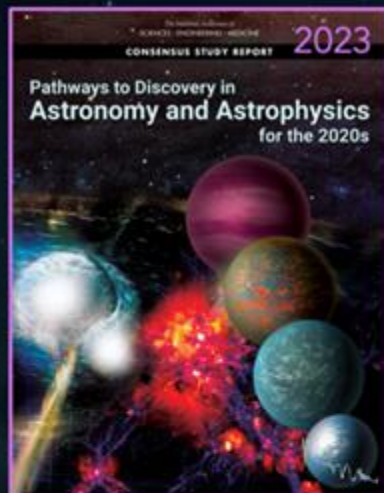
Demographics &  
Architectures

Earth-Like Atmosphere Demographics

Giant Exoplanet Orbital Evolution

Exoplanet Occurrence Rates in Binary Systems

Exoplanet Occurrence Rates of Small Exoplanets



- Lots of momentum from earlier working group! (More than 100 participants in Birth & Evolution)
- Limited representation in current HWO leadership (including both CSIT and HWO SIG)
- Work remains to formulate science cases and requirements
- Exciting science with complementarity to other facilities (PRIMA, Roman, ALMA, Keck...)

# Why create a SAG?

Addresses ExEP science gaps 4, 11, and 17:

- SCI-04: Planetary system architectures: occurrence rates for exoplanets of all sizes
- SCI-11: Understanding the abundance and distribution of exozodiacal dust
- SCI-17: Understanding planet formation and disk properties

# ExEP Science Gaps

- Roman CGI will be a pathfinding tech demos for HWO
- Roman will *also* will be doing lots of incredible circumstellar disk science with this tech (Multiple disk-related white papers already submitted as part of Roman CGI call)
- By forming this SAG now, we can enhance the planet formation science done with Roman *and* build towards HWO

# Observatory Synergy

- Energize the planet formation community for upcoming flagship missions including Roman and HWO
- Develop new planet formation science cases
- Explore how multi-wavelength observations enhance the possible planet formation science
- Document requirements for coronagraphic disk imaging
- Investigate exozodi both as a nuisance and an independent science case
- Involve early career researchers in mission development

# Goals

- Two Co-Chairs and a leadership team with roughly 5-6 members (including those proposing this SAG, Meredith MacGregor and Briley Lewis)
- Additional working group members recruited from the broader community
- Community members can join sub-groups focused on tackling specific goals

# Structure

- Regular working group meetings to plan and assess progress towards goals
- Monthly (every other month?) community talks highlighting planet formation science that can be done with HWO, Roman, and other complementary facilities
- Slack channel to coordinate activities
- Active presence at AAS and all HWO meetings
- Publish papers and/or white papers to share results
- Compile a coherent HWO Planet Formation report

# Activities