Exoplanet Yield Modeling Tools Workshop Remix

243rd AAS meeting splinter session (hybrid)

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January 11, 2024; 9am – 11am CST

Chairs: Rhonda Morgan, Dmitry Savransky

About the Workshop:

NASA has responded to the recommendations of the astrophysics decadal survey by establishing the Great Observatories Maturation Program (GOMAP) to reduce risk for the Habitable Worlds Observatory and lay the groundwork for future great observatories. A key element of this maturation will be the evaluation of the impact of design options on science outcomes – and specifically, science yield modeling.

To support the advancement of our yield modeling capabilities, and to inform the community of our current capabilities, NASA's Exoplanet Exploration Program is planning a hybrid workshop on January 11, 2024, a splinter session of the 243rd AAS meeting in New Orleans, LA. This workshop is an abridged repeat of the ExEP Yield Modeling Tools Workshop held June 8, 2023 as a splinter of the 242nd AAS meeting in Albuquerque, NM.

The purpose of this workshop is to:

- Bring together the vibrant communities of mission and instrument designers and yield modelers to share their expertise
- Introduce fundamental concepts in exoplanet imaging yield modeling
- Present state of the art yield modeling tools available for use today and provide basic instruction in their use
- Discuss gaps in yield modeling approaches and potential future efforts to close them

This workshop will be open to all and will provide a valuable foundation for those interested in yield modeling, from students new to the field to experts with decades of experience. In keeping with NASA's and the community's commitment to Inclusion, Diversity, Equity, and Accessibility (IDEA), those with diverse or under-represented backgrounds are especially encouraged to attend. To maintain accessibility of the material to a broad audience, no level of previous knowledge is expected. The workshop will include resources for anyone wishing to learn more about various elements of yield modeling and will include live working sessions where participants will try out the current generation of modeling codes and learn how these can contribute to their own work.

Agenda Pre-Session:

Pre-recorded short talks (5-10 minutes each) on the fundamental concepts of yield modeling tools are available to participants.

- Star Catalogs (Erik Mamajek)
- Occurrence rates and planet demographics (Jesse Christiansen)
- Planet generation Planet propagation and Orbit geometry (Eric Nielsen)
- Exozodiacal light (Bertrand Mennesson)
- Photometrics Part 1 - Coronagraph Parameters and SNR (Bijan Nimati)
- Photometrics Part 2 - SNR Structure (Bijan Nimati)
- Photometrics Part 3 - Random Noise and Time to SNR (Bijan Nimati)
- Starlight suppression system modeling (John Krist)
- Completeness Delta Mag and Integration Time (Dmitry Savransky)
- Bonus 1 - Population Demographics Modeling (Shannon Dulz)
- Bonus 2 - Photon Counting with EMCCDs (Bijan Nimati)

Agenda:

0. Rhonda Morgan (10 mins): brief introduction and speedy overview of the fundamentals / goals of session / importance of yield tools for science requirements and mission requirements
1. Dmitry Savransky (30 mins): detailed overview of EXOSIMS open source mission simulation tool.
2. Chris Stark (20 mins): detailed overview of AYO (Altruistic Yield Optimization)
3. Rhonda Morgan (20 mins) Interactive tutorial of EXOSIMS using GoogleCollab-hosted Jupyter notebook
4. Alexander Howe (30 mins) Interactive tutorial of ExoVista
5. Rhonda Morgan facilitates (10 mins): Q&A and discussion of priorities for future model improvement