

The Future of Exoplanet Science

CAA Meeting, Washington DC
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(Exoplanet Exploration Program Analysis Group)

Past ExoPAG activities

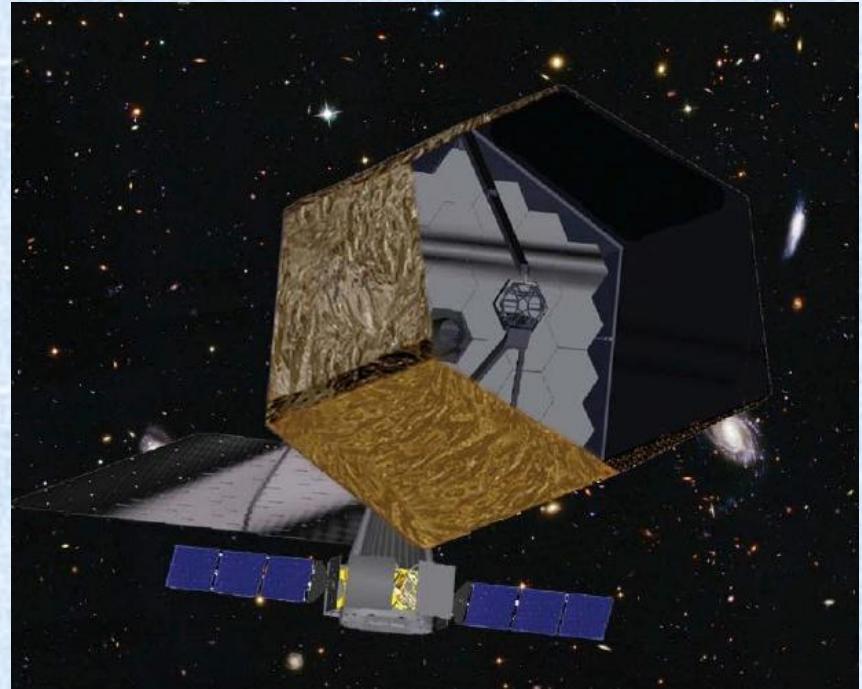
- The ExoPAG has had 5 meetings since January, 2010
 - These meetings have been well attended, with about 70-80 people at the winter meetings and 50-60 in the summer
- Following recommendations of the Astro2010 survey, the main (but not the only) topic of discussion has been planning for a future flagship-class direct imaging mission
 - Technology development for the **New Worlds Observer** program was the highest medium-class priority listed in the report
 - Our hope as of January, 2011, was to try to choose between two mission architectures (**internal coronagraph** vs. **external occulter**) by 2015, so that promised technology development money could be channeled into a single mission concept, making it potentially selectable in 2020
 - Joint meetings/discussions with **COPAG** have taken place, as they are also interested in a large optical/UV space telescope

Recent developments

- Within the last year, momentum in this direction has slowed considerably
 - Planned **Instrument Performance Studies** by the JPL Exoplanet Exploration Program Office were postponed indefinitely due to lack of funds
 - ExEP managers at Headquarters and at JPL began hearing complaints from the exoplanet community (including internally at JPL) that we should be focused on more short-term goals
- In response to this pressure, we have decided to let the ExoPAG, and the associated exoplanet science community, find its own direction for the time being
- That, however, *does not change* the long-term exoplanet exploration strategy...

Long-term exoplanet strategy

- In the long term, we want to find and *characterize* rocky planets around nearby stars
 - JWST will not do this, except possibly for a few transiting planets around nearby M stars
- We need big (4-16 m), space-based telescopes to do this
 - One very ambitious concept (Marc Postman's **ATLAST** telescope) is shown at the right (Marc also has 8-m and 9-m versions)
 - Sizing of the telescope depends on two critical factors: 1) η_{Earth} (which we will hopefully get from Kepler), and 2) the exozodi background (which we will hopefully get from LBTI)



<http://www.stsci.edu/institute/atlast/images/ATLAST16m.jpg>

A personal view

- My own personal view (not shared generally by the ExoPAG, or even its steering committee) is that we should think bigger, rather than smaller, and that we should plan for a long-term (20+ year) mission
 - Part of my thinking is that nothing is going to happen in the short-term anyway, because of JWST; thus, we have time to do things properly
 - I also want to reduce *risk*. Sending up large, multi-billion-dollar telescopes is a risky business if you have no way of fixing them if they don't work. Occulters are also inherently risky because they have never been flown. Neither have high-contrast coronagraphs
- These concerns can be addressed by designing a **serviceable** space telescope ⇒

Partnering with the manned space program

- The Hubble Space Telescope, arguably NASA's most successful scientific mission ever, was serviced **5 times** by astronauts (including two missions by new Associate Administrator John Grunsfeld)
 - This allowed Hubble to return *great science* for over 20 years
- We should be thinking about the same type of (serviceable) observatory for New Worlds Observer
 - This means **reinvigorating the manned space program**, but that is something that we ought to be doing anyway
 - Robotic servicing is also a possibility
 - This telescope would *not* just be useful for looking at exoplanets; hence the collaboration with COPAG

