

2021-01-22 Meeting notes

Date

22 Jan 2021

Attendees

Julie McEnery, Anton Koekemoer, Ashley Villar, Brant Robertson, Chris Hanley, Cristina Oliveira, David Spergel, Dimitri Mawet, Dominic Benford, Edward Wollack, Gisella de Rosa, Gregory Mosby, Harry Ferguson, James Rhoads, Jeff Kruk, Jessica Lu, Jessie Christiansen, John Mackenty, Joshua Schlieder, Karrie Gilbert, Keith Bechtol, Ken Carpenter, Lee Armus, Megan Donahue, Neil Zimmerman, Peter Melchior, Roeland van der Marel, Ryan Hickox, Sangeeta Malhotra, Zeljko Ivezic

Agenda

- project update - Julie McEnery
- Deep field discussion - Brant Robertson

Minutes

project update - Julie McEnery

Completed installation and alignment of all 18 ETU sensor chip assemblies on mosaic plate.

Q: why do the cameras have different colors in the pictures?

A: The SCAs are antireflection coated for bands at R-2 microns, and you can see the blue/green reflection at wavelengths that aren't part of the A/R requirement. There are lots of wiggles in the AR coating at bluer wavelengths (<~500nm), so that's probably why you see that light reflected.

WFI CDR next week

Minor updates to science requirements. Flowdown after moving some operation software from science teams to STScl and IPAC

AAS sessions went well: <https://roman.gsfc.nasa.gov/AAS237>

There is a "stub" for upcoming Roman ROSES call. Serves as placeholder, so very general. Most details yet to be defined. Extensive discussions in this group after the call is public next month.

The DRM answers Astro2010 cosmology and exoplanet science requirements.

Do we want to allocate some GO time now for a deep field, selected via open community process?

This does not mean the amount of GO time available just before launch will necessarily drop below 25%

There is some margin in the DRM. An early deep field might overlap with HLS or SN1a needs (both of which have deep fields as part of the current strawman plan), in which case, time needed for those surveys would be less.

Focus on the large questions? Is it scientifically valuable to define a deep field now?

What do we need to ensure community buy-in? The current 3 community surveys are backed by Astro2010.

Calibration needs? Press/outreach?

Implementation details will be in partnership with science centers?

Single key science team or multiple smaller groups

Q: Is calibration/commissioning considered as part of the total allotment of time as part of trade-space with surveys + GO time, or is this considered separately?

A: things that are necessary for the mission as a whole are not part of the time allotment being subdivided for science observations. It's roughly 5% if memory serves, and so we're really looking at 95% of the five years -- which is close enough to all of it that we don't usually worry much about the difference. (and commissioning is lumped into a 3 month period before the 5 years of prime mission operations).

Important to keep the opportunity cost in view.

Deep field discussion - Brant Robertson

In addition to Roman, ALMA, JWST, Rubin, and TMT will all enable major contributions to extragalactic astronomy

Science questions:

Can we quantify the importance of galaxies and quasars for reionization?

Galaxy properties in the context of their environments over cosmic time?

Spectroscopy of galaxy evolution during peak era of cosmic star formation?

What will exotic, distant supernovae tell us about early stellar populations?

HST UDF led to discovery of highest redshift galaxies. With Roman, you get 100x WFC3 FoV, with similar sensitivity.

Reionization, if completed late, means galaxies in redshift range $z=6-8$ dominated reionization. Faint galaxies important.

UDF12 found distant star-forming galaxies at $8.5 < z < 12$

Cosmic variance - surveys typically only probe small volumes, not cosmological volumes. Roman FoV beats down cosmic variance.

Ionized bubbles are large, so a small area survey can be biased.

Anton published a WFIRST deep field working group white paper.
Field choice: considerations of zodiacal background and reddening
Multiple filters redward of the observed Ly-alpha line valuable.
A Roman UDF in 0.28 deg^2 would reach ZYJH-29.5 AB

Discussion

Peter: Deep fields could be useful for calibrations in different surveys. Could be used to improve photometric redshift estimators, source deblending. Having a deeper version of a wide survey. Plus anything that needs priors (e.g. for spectral or morphological models) would benefit from reduced noise and higher completeness

Jeff: A deep field definitely be useful for a range of instrumental characterizations, but also for some astrophysical systematics.

Dara: If we have a lot of repeated exposures (instead of a few long ones) testing photometric and astrometric stability before the start of the microlensing survey; testing deblending methods before we start the HLS

Jeff: We will definitely have "touchstone fields" that are revisited regularly for just that reason.
Such fields would be placed in the CVZ so they can be available any time. A deep field doesn't have to be in the CVZ, but could be

Jessica - I think for many of these calibration/monitoring/characterization needs, you don't need to go "deep". It is not clear to me why a deep field does better/worse than any of the other interesting non-allocated surveys.

Dominic: the total WFI calibration is of order 100 days over the mission life, and lots of it may not be that useful for mimicking a deep field. Relative astrometry is allocated only like 5 days over the mission life. It's fine to plan on using the calibration for science, but calibration isn't driven by science. A deep field is the opposite.

Jessie: For sure, we need to do the calibration we need, just wondering if we could also be doing science with those calibrations :D

Dominic: Absolutely! As long as we have our eyes open about the limitations of calibration observations.

Keith: I'm also thinking about having a high-value, self-contained dataset early that is beneficial to community for learning the tools and data model, science performance, etc.

Megan: But depending on the timing of those 100 nights it's not obvious you invest them on a deep field
What about crowded-field photometry at the limit of Roman? (crowded fields: stars in nearby galaxies, galaxies in clusters) -- if you want to push photometry maybe don't start with the photometry challenge we're kinda good at...

Jessica - haven't heard about other options for how we can use GO time. What makes deep field special consideration versus other ideas like nearby galaxies?

Jessie: I want to echo Jessica's comment, I wrote down the very same thing right at the start

Of all things that were not recommended by the decadal survey, why are we hearing about deep fields, and will we be discussing other potential science?

Dara: I agree that we should be considering the deep field in larger context. Not just of 'the' science but of the science opportunity access.

Ryan: Thanks Jessica et al. for raising the point about access and prioritization. Good discussion!

David S - Preparatory ground-based data coordination drives timing for discussing deep field now. Synergy with JWST.

Roeland - Call for community white papers? That way we can consider multiple survey ideas that need to be coordinated well before a GO call.

Megan: A white paper call REALLY soon sounds like a good idea to me..

Ryan: Agreed on a white paper call.

Jessica: I like the white paper call idea as well.

Dominic: @Megan White papers are a great tool -- in which case, what do we ask for?

Jessie: And this white paper call would be specifically for "GO stuff that should be started/executed ASAP for <reasons>"?

Ryan: Yes. I would particularly like to hear details about precisely what the benefits of going early are. David's mention of Subaru PFS is one of them but I think the details and timeline are very important in this discussion.

Dominic: @Jessie Sounds good, in which case we then have to decide how that input informs a decision on whether to *actually* issue a GO call. sort of like Astro2020 trying to figure out what to do with the Probe studies...

Julie - We're out of time, so let's continue this discussion at our next meeting. We'll also hear about pilot survey study.