Your Title

Thematic Areas (Check all that apply):

☐ (Theme A) Key science themes that should be prioritized for future JWST and HST observations
☒ (Theme B) Advice on optimal timing for substantive follow-up observations and mechanisms for enabling exoplanet science with HST and/or JWST
☐ (Theme C) The appropriate scale of resources likely required to support exoplanet science with HST and/or JWST
☐ (Theme D) A specific concept for a large-scale (∼500 hours) Director's Discretionary exoplanet program to start implementation by JWST Cycle 3.

Summary: We advocate that the ideal observing setup for transiting exoplanet science in the near-infrared, for the mast majority of science cases and targets, is the combination of NIRISS/SOSS and NIRSpec/G395 rather than NIRSpec/PRISM. The NIRISS/SOSS + NIRSpec/G395 combination should be a standard for the field; both are vital for a complete picture of an exoplanet atmosphere in the near-infrared.

Due to the unprecedented opportunities presented to the transiting exoplanet community by JWST, there is a clear need to not only undertake critical and innovative science programs, but also to utilize the optimal techniques and instruments for their execution. From the modes covering near-infrared (NIR) wavelengths, two main avenues have emerged to observe this key spectral range: NIRSpec/PRISM[1,2] ($\sim$0.5 – 5.0 µm, R$\sim$100), and the combination of NIRISS/SOSS[3–6] ($\sim$0.6 – 2.8 µm, R$\sim$700) and NIRSpec/G395H/M[1,7] ($\sim$2.8 – 5.0 µm, R$>$1000). NIRSpec/PRISM has the advantage of covering the entire wavelength range in one observation, whereas the NIRISS/SOSS + NIRSpec/G395 combination requires two. However, the NIRSpec/PRISM brightness limit is $J\sim$11.4, significantly fainter than for either NIRISS/SOSS or NIRSpec/G395.

Saturation is a complex, and potentially intractable, problem that the community does not yet have a clear path to tackling. Futhermore, even for non-saturating targets, JWST's NIR detectors are subject to poorly-understood low-group-number effects, where the differences in counts between subsequent groups are not constant after non-linearity correction — particularly for the first $\sim$5 groups (e.g., Fig. 8 in[8]). For observations with a large number of groups, such effects can likely be mitigated. However, when a significant fraction of the total number of groups is affected, there are likely to be biases in absolute flux, as well as transit depths. The large offsets detected between the NIRSpec/PRISM observations of WASP-39 b compared to all other instruments, even when discounting the region where PRISM saturates, may be such an example (Carter & May, et al. *in prep*).

In situations where NIRSpec/PRISM can be safely used, with *at least five unsaturated groups*, it is surely the optimal instrument for NIR observations of transiting exoplanets. However, this corresponds to only approximately 15% of all targets. For the remaining 85% **NIRISS/SOSS + NIRSpec/G395 must be the preferred combination**. The community should prioritize using both modes in combination, as opposed to prioritizing one over the other; NIRSpec/G395 is necessary to unlock carbon chemistry, and NIRISS/SOSS is critical to anchor the spectrum at short wavelengths[9] and correct for potential biases from the transit light source effect[10,11]. Furthermore, this combination has the advantage of increased resolution over NIRSpec/PRISM, unlocking additional science[12] and probing narrow features that can be essential in confirming molecular detections. Despite the downside of requiring more observing time, the combination of NIRISS/SOSS + NIRSpec/G395 is the optimal configuration to probe the NIR spectra of transiting exoplanets and should be the default for such programs moving forward.

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