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Newly Identified Ultraviolet Diversity from HST/STIS Observations of High-Velocity SNe Ia

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Despite using Type Ia supernovae (SNe Ia) to precisely measure cosmological parameters, we do not know basic facts about the progenitor systems and explosions. Theory suggests that SN Ia progenitor metallicity is correlated with peak luminosity, but not how quickly it fades, which we use to calibrate the luminosity and measure distances. This effect should lead to an increased Hubble scatter, reducing the precision with which we measure distances. If the mean progenitor metallicity changes with redshift or population, cosmological measurements such as the dark energy equation-of-state parameter and the Hubble constant could be biased. Models also indicate that changing progenitor metallicity will have little effect on the appearance of optical/NIR SN data, but significantly alter UV spectra. The sample of SN Ia with near-peak UV spectra is historically lacking in its representation of high-velocity (HV) SN Ia. Recent HST/STIS observations of HV SN Ia (SN 2021J, SN 2022hrs, and SN 2023gft) have revealed unaccounted trends in UV models that are difficult to disentangle from trends with light-curve shape. I will present these data and discuss their implications for how evolving SN Ia populations with redshift may impact our cosmological distance measurements.

Authors: SIEBERT, Matthew (Space Telescope Science Institute); TSST TEAM

Presenter: SIEBERT, Matthew (Space Telescope Science Institute)

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