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Oral
(Invited Talk)
Interplanetary coronal mass ejections (ICMEs) are the major drivers of space weather. Understanding how they propagate from the Sun and evolve in the heliosphere is important for predicting their potential impact at the Earth, other planets, and spacecraft. The upcoming PUNCH mission will provide us with new observations particularly suited for studying ICMEs: near-Sun coronagraph and wide-field heliospheric imaging data of both polarized and unpolarized white-light. To facilitate the analysis of these data in efficient manner, our team develops a set of synthetic observations.

We here present a newly set of synthetic observables called 'CME Challenge v2.0', in which both the modeling and the white-light synthesis had been updated. This is a set of 3D MHD simulations of several synthetic events that are launched in different parts of the solar wind and have different properties. PUNCH-like data are calculated for a simulated observer that is looking at each event from different viewing angles. The properties of the first event are published openly, while the properties of the rest of the events are disclosed upon request. This is done to aid with the validation of CME reconstruction methods, for when a 'blind' testing is desired. For all these events, we distinguish between model parameters and the ground-truth data: the former describes initial properties of a CME (such as a starting velocity), while the latter is derived from the 3D MHD simulation volume and may be different from the starting values (such as the case for a CME decelerating in solar wind). We explain how the 'ground truth' values are derived, and demonstrate this effect with velocity and trajectory in particular.
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