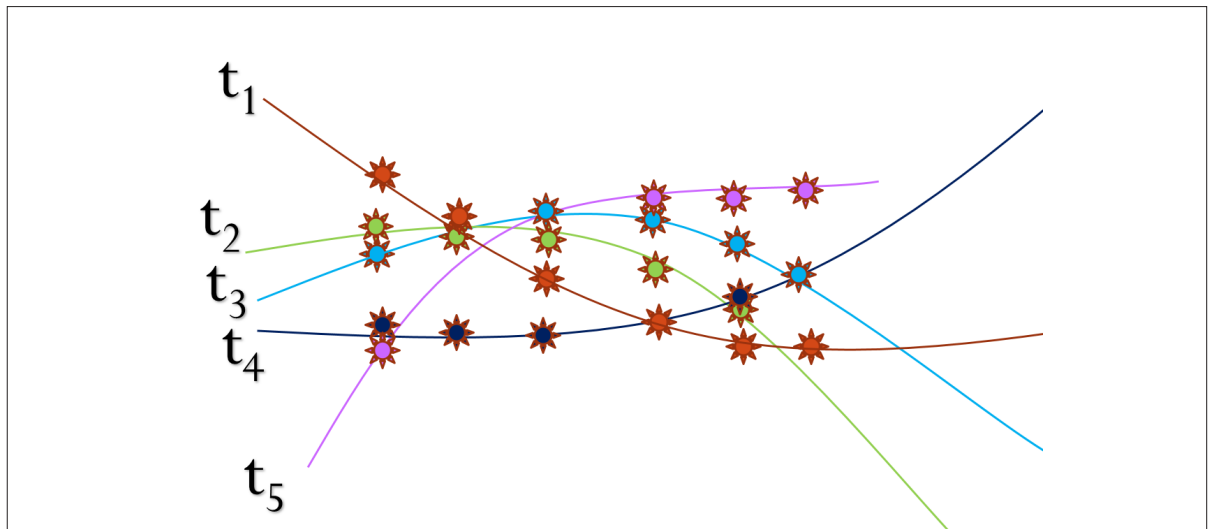




## Simone Mazza

University of California, Santa Cruz

**May 12, 2022 at 1:00 p.m. in WL-216 & Zoom**  
**4D tracking technologies and R&D**



Precision Timing information at the level of 10-30ps is a game changer for detectors at future collider experiments. For example, the ability to assign a timestamp with 30ps precision to particle tracks will mitigate the impact of pileup at the High-Luminosity LHC (HL-LHC). With a time spread of the beam spot of approximately 180ps, a track time resolution of 30ps allows for a factor of 6 reduction in pileup. HL-LHC will only be the first in HEP experiments to exploit the concept of 4D tracking using time as one of the parameters. The most cited technology to achieve 4D tracking in the international community is Low Gain Avalanche Detectors (LGADs). LGADs are thin silicon detectors with moderate internal signal amplification. LGADs can provide time resolution of a few 10's of pico-seconds for minimum ionizing particles. In addition, the fast rise time and short full charge collection time (as low as 1 ns) of LGADs are suitable for high repetition rate measurements in photon science and other fields. Currently, LGADs are intrinsically limited to ~mm granularity, a significant roadblock to achieving true 4D tracking. However, several new LGAD technologies emerged in the past few years that would allow to increase the reachable granularity down to 10s or microns: AC- coupled LGADs, trench insulated LGADs, deep junction LGADs and others. This presentation will show a review of the past few years of research geared towards 4D tracking and LGADs applications at the electron-ion collider, the pioneer experiment and beyond.

There will be a luncheon with the speaker from 12-1 p.m. in WL-216. Lunch will be provided for people on a first-come, first-served basis who RSVP by 3:30 p.m. on Tuesday, May 10th.

Host: Laura Havener

Connection info: <https://yale.zoom.us/j/98300235819>

*Sponsored by the Flint Fund, Yale Wright Laboratory, Yale University, and the Yale Physics Department.*