Abstract Submitted
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**Direct imaging of spatially and temporally heterogeneous two-state dynamics on metallic glass and amorphous silicon surfaces well below $\mathbf{T}_g$**[1] SUMIT ASHTEKAR, GREGORY SCOTT, JOSEPH LYDING, MARTIN GRUEBELE, University of Illinois Urbana Champaign — Probing glassy dynamics of atomic glass formers with atomic resolution far below the glass transition has remained elusive due to the long waiting times and the small length scales involved. Here we report atomic resolution movies acquired using time-lapse scanning tunneling microscopy on metallic glass and amorphous silicon (a-Si) surfaces at room temperature well below their respective glass transition temperatures (Tg of glasses studied lie between 600-1000K). We find the clusters on metallic glass surfaces with size 2-8 atomic spacings exhibit dynamics which are almost exclusively two-state ($P_{3-state}$ ~0.06) [1]. The two-state dynamics was found to be both spatially and temporally heterogeneous. We attribute the two-state dynamics to the secondary $\beta$ relaxations which remains active well below the glass transition. Similar dynamics were found on amorphous silicon surfaces providing the first evidence for the existence of glass-like dynamics on pure a-Si surfaces at non-cryogenic temperature.

[1] S. Ashtekar et.al. J. Phys. Chem. Lett., 2010, 1 (13), pp 1941–1945

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