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**Lattice irreversibility and enhanced fragility under fatigue in amorphous solids** DESPINA LOUCA, PENG TONG, University of Virginia, GONGYAO WANG, PETER LIAW, University of Tennessee, YOSHIHIKO YOKOYAMA, Tohoku University, ANNA LLOBET, Los Alamos National Laboratory, YIMING QIU, NIST Center for Neutron Research — The enhanced brittleness observed in glassy ZrCuAl metallic alloys under mechanical cyclic fatigue loading is linked to a local atomic structure reorganization and suppression of atomic fluctuations. From the analysis of neutron scattering and the pair density function technique, an atomic cluster restructuring is observed that intensifies with increasing the compression cycles ex-situ. This is accompanied by an attenuation of the extended phonon-like lattice dynamics, beyond the region in the momentum space where the Boson peak appears, observed by inelastic neutron scattering. Together both effects most likely render the glass more fragile. These findings provide a direct link between the plasticity and the internal structure of metallic glasses under fatigue.

Despina Louca
University of Virginia

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