1152-55-24 **Adam Spannaus*** (aspannau@vols.utk.edu), Department of Mathematics, 227 Ayres Hall - 1403 Circle Drive, Knoxville, TN 37996, and **Kody J.H. Law**, **Farzana Nasrin**, **Cassie P Micucci**, **Peter K. Liaw**, **Piotr Luszczek**, **Louis Santodonato**, **David J. Keffer** and **Vasileios Maroulas**. *Materials Fingerprinting Classification.*

State-of-the-art methods for visualizing the local atomic structure, such as atom probe tomography (APT), create noisy and sparse datasets comprised of millions of atoms, but are currently unable to determine the lattice structure. Viewed through the lens of topology, the essential differences between body-centered and face-centered crystal structures are revealed, allowing researchers to discern materials composed of either lattice type from the APT data. In this talk, we describe how to characterize these fundamental building blocks via topological descriptors and how we combine these descriptors to create an accurate prediction algorithm. Using a new paradigm in computationally-driven materials science, we propose a materials fingerprint – a machine learning methodology for determining the crystal structure of a material from a noisy and sparse dataset. Using this fingerprinting method, the crystal structures of high-entropy alloys are classified with near perfect accuracy using the APT data. (Received July 10, 2019)