

Hakeem M. Oluseyi – Colloquium – March 24, 2023  
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Title: Hack the Stars

Abstract:

My research is focused on what I have dubbed, “star hacking.” The foundation of my work is in two areas of astrophysics: astronomical survey science for cosmology and solar/plasma physics. “Hacking” references the fact that I not only utilize observations and theory of the Sun and stars to advance knowledge of the objects under study but also to develop new technologies and advance understanding of other systems. For example, leveraging astronomical techniques for interpreting electromagnetic radiation led to patented seminal technologies for spectroscopic in-situ diagnostics and control in plasma-based semiconductor manufacturing. Identification of scale-invariant ion acceleration processes in the solar corona resulted in the design of an innovative experiment for initiating 3D magnetic reconnection in the laboratory, producing  $\sim 3,000$  km/s ion beams suitable for ion propulsion. Machine-learned identification and classification of periodic variables in astronomical surveys of tens of millions of stars resulted in: new stellar diagnostics and time-domain informatics techniques, the discovery of previously unknown Milky Way satellites and tidal streams, and constraints on Galactic evolution. I’ll discuss ongoing projects and future opportunities.