

NRAO/Socorro Colloquium Series**Tom Vestrand***LANL*

Thinking Telescopes and Dynamic Coalition Architectures

Abstract

Across the electromagnetic spectrum from radio frequencies to very-high energy gamma-ray energies, and even in new “multi-messenger” channels like neutrinos and gravitational waves, comprehensive, time-domain, sky surveys are now being developed and deployed. These surveys will be powerful engines for identifying transient behavior and they will drive an explosive growth the number of opportunities to explore time domain phenomena in astronomical sources. I argue that optimization of the scientific return in this opportunity-rich environment will require a qualitative change in current observational approach applied to the study of transients. The key assumptions that drive of my conclusion are: (1) That multi-wavelength observational follow-up will be essential for unraveling the physics of the transients; (2) A significant fraction of time-domain transients of interest cannot have follow-up observations scheduled ahead-of-time (we don’t where and when they will happen); and (3) The new surveys will generate so many events that follow-up systems will be overwhelmed—making triage essential. I present the case that the optimization solution must employ autonomous robotic telescopes, globally distributed telescope networks, and artificial intelligence/machine learning. The “Thinking” Telescopes Project at Los Alamos National Laboratory has applied these new technologies to construct a network of RAPTOR (RAPid Telescopes for Optical Response) robotic telescopes that autonomously collect real-time optical observations of Gamma-Ray Bursts (GRBs). I will discuss why this ecosystem of robotic telescopes was built, how we built it, and how it is changing our understanding of GRBs—nature’s largest explosions since the Big Bang. And, I will discuss an approach to real-time transient follow-up called a Dynamic Coalition Architecture that has great promise for the optimization of the scientific return in the coming opportunity-rich environment.

November 13, 2015**11:00 am****Array Operations Center Auditorium****All NRAO employees are invited to attend via video, available in Charlottesville Auditorium, Green Bank Auditorium, and VLA Video Conference Room.****Host: Bryan Butler**
