



The Virginia Tech Physics Department presents the  
following colloquium:

**Dr. Nahum Arav**  
(Center for Astrophysics and  
Space Astronomy, University of  
Colorado, Boulder)

*Quasar Outflows and their Role in  
Cosmological Structure Formation*

**Abstract:**

Over the last few years the potential importance of quasar outflows on the growth of super-massive black holes, enrichment of the intergalactic medium, evolution of the host galaxy and cluster cooling flows has been widely recognized. I will review these new theoretical developments and describe the efforts of our research group to determine the most relevant parameters for these models: Kinetic luminosity and Chemical abundances of observed quasar outflows.

**Friday, Feb. 16**  
**210 Robeson Hall**  
**2:30 P.M.**

