

DAMOP12-2012-020043

Abstract for an Invited Paper
for the DAMOP12 Meeting of
the American Physical Society

**Will Allis Prize for the Study of Ionized Gases Lecture: Electron and Photon Collisions with Atoms
and Molecules**

PHILIP G. BURKE, Queen's University Belfast

After a brief historical introduction this talk will review the broad range of collision processes involving electron and photon collisions with atoms and molecules that are now being considered. Their application in the analysis of astronomical spectra, atmospheric observations and laboratory plasmas will be considered. The talk will review the *R*-matrix computational method which has been widely used by international collaborations and by other scientists in the field to obtain accurate scattering amplitudes and cross sections of importance in these applications. Results of some recent calculations of electron and photon collisions with atoms and molecules will be presented. In conclusion some challenges for future research will be briefly discussed.