Spectral Modeling And Diagnostics In Various Astrophysical Environments

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Abstract. In this contribution I discuss various complex astrophysical environments and tools to derive the physical parameters of these environments. Multi-temperature plasmas in extended sources like clusters of galaxies present a challenge in the proper balance between simplicity and detail of the temperature structure, while biases in derived parameters like chemical abundances need to be avoided. Resonance scattering, in particular in Fe XVII lines, is another challenge because of uncertainties in atomic cross sections. I will also discuss recent highlights in modeling the galactic foreground absorption from the mixture of dust, cold en hot gas that is present in our galaxy. The last topic will be photo-ionized plasmas in active galactic nuclei. I will discuss models for the absorption measure distribution as well as time-dependent photo-ionization in these sources. Examples will be given using the SPEX package that was developed at SRON.