Title: Radiative processes in High Energy Astrophysics and Cosmology

Lecturers: M. Liguori (16 hours) & R. Turolla (8 hours)

Contents:

1) Compton scattering and High Energy Astrophysics:

- Kinematics
- Thermal Comptonization and Kompaneets equation
- Dynamical Comptonization
- Hard tails in X-ray binaries

2) The Cosmic Microwave Background (CMB):

- CMB thermalization and spectral distorsions
- CMB temperature anisotropies
- CMB polarization

3) The Sunyaev-Zel'dovich effect:

- Kinematic and thermal SZ
- SZ effect in cosmology: CMB signatures
- SZ and detection of galaxy clusters

4) Software and applications:

- Einstein-Boltzmann codes for CMB anisotropies: using the CAMB software

References:

- G.C. Pomraning, "The equations of radiation hydrodynamics", Pergamon Press, 1973
- G.B. Ribicky and A.P. Lightman, "Radiative processes in Astrophysics"
- S. Dodelson, "Modern Cosmology", Academic Press, 2003
- M. Birkinshaw, "The Sunyaev-Zel'dovich effect", Physics Reports, Volume 310, Issues 2-3, March 1999, Pages 97-195