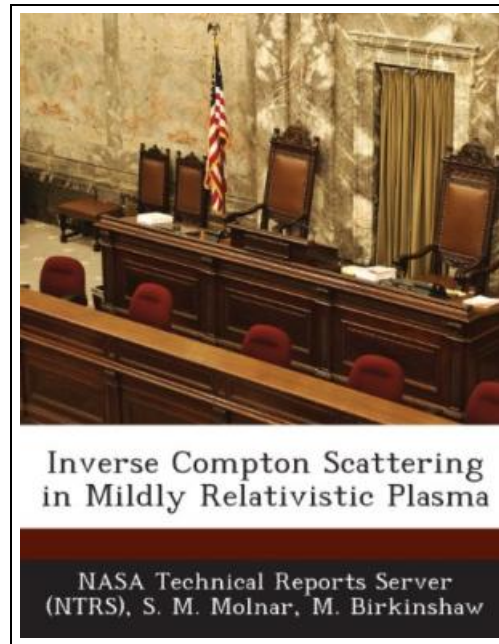


## Inverse Compton Scattering in Mildly Relativistic Plasma



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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 32 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. We investigated the effect of inverse Compton scattering in mildly relativistic static and moving plasmas with low optical depth using Monte Carlo simulations, and calculated the Sunyaev-Zeldovich effect in the cosmic background radiation. Our semi-analytic method is based on a separation of photon diffusion in frequency and real space. We use Monte Carlo simulation to derive the intensity and frequency of the scattered photons for a monochromatic incoming radiation. The outgoing spectrum is determined by integrating over the spectrum of the incoming radiation using the intensity to determine the correct weight. This method makes it possible to study the emerging radiation as a function of frequency and direction. As a first application we have studied the effects of finite optical depth and gas infall on the Sunyaev-Zeldovich effect (not possible with the extended Kompaneets equation) and discuss the parameter range in which the Boltzmann equation and its expansions can be used. For high temperature clusters ( $k_{\text{B}}T_e$  greater than or approximately equal to 15 keV) relativistic corrections based on a fifth order expansion of the extended Kompaneets equation seriously underestimate the Sunyaev-Zeldovich effect at high frequencies. The contribution from plasma infall is less important for reasonable velocities. We give a convenient analytical expression for the dependence of the cross-over frequency on temperature, optical depth, and gas infall speed. Optical depth effects are often more important than relativistic corrections, and should be taken into account for high-precision work, but are smaller than the typical kinematic effect from cluster radial velocities. This item ships from La Vergne, TN. Paperback.



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