approximation to the solution of the z-process capture chain, we have solved exactly the problem of an arbitrary sequence of cross sections having two distinct values $\sigma_1$ (small) and $\sigma_2$ (large). This problem can nicely simulate the real one. By comparing with the CFEZ solution to the same sequence, we check the accuracy of their approximation. The fidelity is found to depend on both $\tau$ and $k$, but in such a way that the CFEZ solution is reasonable. The solution is trivially generalized to include a third class of very large ($\sigma_\infty$) cross sections, thereby better approximating the real problem.

TUESDAY 4 DECEMBER

Session 15: Small Auditorium, 0830–1200

Invited

15.0A.11 Copernicus. O. J. GINGERICH, SAO.

15.01.07 Power Law Irregularity Structure for the Interstellar Medium. W.M. Cronyn, Clark Lake Radio Observatory, S.E.G/S.O.A.A. --Analysis of dispersion measure fluctuations, multipath dispersion and angular scattering reveals evidence for a power law irregularity structure in the interstellar medium spanning more than 7 orders of magnitude in structure size at 100 MHz for observations of NPD032 reported by W.R. Vandenberg, et al. (1973 Ap.J. 180, L27) and J.M. Rankin and C.C. Councellman, III (1973 Ap.J. 181, 875). Such an irregularity structure offers a more plausible explanation for both qualitative and quantitative features of the observed interstellar impulse response than the two screen hypothesis or other alternatives. The rigid angular-temporal scattering relationship (Cronyn, 1970 Science, 168, 1453) can be irretrievably blurred by the large random temporal delay fluctuations associated with a power law irregularity structure. If the irregularity structure parameters deduced from NPD032 observations hold throughout the interstellar medium, rms fluctuations in dispersion measures of $\sim 0.01\%$ x galactic distance, kpc, over periods of $\sim 1$-5 years (depending on transverse irregularity velocity) can be expected. Finally, the spectral index deduced for the irregularity structure function suggests that dissipation range turbulence is being observed.

15.02.07 Statistical Time-Dependent Model for the Interstellar Gas. H. GEROLA, M. KAFATOS & R. MCGRAY, Joint Institute for Laboratory Astrophysics. -- We present models for temperature and ionization structure of low, uniform density ($n \approx 0.3$ cm$^{-3}$) interstellar gas in a galactic disc which is exposed to soft X-rays from supernova outbursts occurring randomly in space and time. The structure was calculated by computing the time record of temperature and ionization at a given point by Monte Carlo simulation. The calculation yields probability distribution functions for ionized fraction $x$, temperature $T$, and their various observable moments. These time-dependent models predict a bimodal temperature distribution of the gas with structure in $x$, $T$ that agrees with various observations. Cold regions in the low density gas may have the appearance of clouds in 21-cm absorption. The time-dependent model, in contrast to the steady-state model, predicts large fluctuations in ionization rate and the existence of cold ($T = 30^\circ K$), ionized ($x = 0.3$) regions.

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