same abundance distribution found in the solar system, then we can show where most of the p-nuclei can be produced directly via low temperature photoneutron processing and the s.s. abundance distribution for the p-nuclei can be reproduced in part. The most likely site for such processing is shown to be at the base of hydrogen rich envelopes accreted by white dwarfs, and if this is the case, then the subsequent NOVA outburst that may eventually result serves as the ideal mechanism for mixing the processed material and injecting it into the interstellar medium. Difficulties with the model include its inability to reproduce the s.s. abundance of the light nuclei and its apparent inability to reproduce at least one of the light p-nuclei. Possible ways in which these difficulties might be overcome and improvements in the results due to improvements in the numerical code used for treating the differential equations describing the growth and decay of the product nuclei will be discussed.

40.12.04 Very Hot Hydrogen Burning. - S. E. Woosley and R. K. Wallace, U. C. Santa Cruz - The energy generation and nucleosynthesis that occurs during hydrogen burning at temperatures in the vicinity of $10^{8}$ K is discussed. Material is found to "break-out" of the O-Limited CN cycle by a series of proton captures and positron decays capable of transforming the initial CN into a distribution of heavy elements up to and including the iron group. This diversion of nuclear flow to heavier elements can lead, at least temporarily, to a much larger energy generation rate (by a factor of 100 or more) than employed in past studies of hot hydrogen burning in such diverse events as the Big Bang, supermassive star explosions, and accreting neutron stars. An important implication may be the synthesis by supermassive objects of a portion of the galaxy's initial metallicity.

AFTERNOON SESSIONS

WEDNESDAY, 11 JANUARY

Session 41: LBJ Auditorium, 1400-1700

41.01.08 Two Dimensional Calculation of Gas Flow in Barred Spiral Galaxies. Larry S. Liebovitch, Harvard-Smithsonian Center for Astrophysics and C. C. Lin, Massachusetts Institute of Technology - Until recently, studies of barred spiral galaxies assumed that the prominent optical bar is also a prominent mass concentration. We assume that the mass distribution of the stars is axisymmetric, except for a 5% to 15% (density wave) perturbation. The potential minima of this perturbing potential is bar-like in the interior and spiral-like in the exterior of the galaxy, looking like the letter "S." This differs from Sanders and Huntley who assumed that the entire galaxy is driven by a bar-like distortion. We calculated the steady state gaseous response to this imposed potential using the time dependent, two dimensional, finite difference, two step MacCormack method. Our velocity field (+) agrees with the limited available observations made near the bars of barred spirals and predicts the velocities (as yet unmeasured) away from the bars. We also find standing shocks whose density maxima lie along the trailing edge of the outer spiral region and along the leading edge of the inner bar region, which agrees with the positions of the dust lanes observed in barred spirals.


We investigate the response of rotating disks of gas to bar-like perturbations in galactic gravitational fields. In particular, two-dimensional, time-dependent, numerical hydrodynamical calculations have been performed in order to determine the steady-state response of disks of gas to rotating, bar-like perturbations. Two types of bar-like perturbations are considered here: oval distortions in the axisymmetric gravitational field of the disk and heterogeneous prolate spheroids. The calculations reveal that, in the absence of gaseous self-gravity, a viscous, differentially-rotating disk of gas responds to a rotating bar-like perturbation by forming a central gas bar with two trailing spiral waves. The local phase of the gas response is primarily a function of the number and spacing of the principal resonances in the disk. This result may be understood in terms of particle orbit theory (see also Sanders and Huntley 1976). The gas response to bar-like perturbations also depends on the relative strength and the effective axial ratio of the bar. In these calculations strong, narrow bars produce