HC 10
Strong Binding Spectrum for the Quasipotential Equation and its Generalizations. H.W. Crater, University of Tennessee Space Institute, and Terry Lee Palmer, Vanderbilt University.--Both 4 vector and generalized Lorentz scalar forms of the Coulomb potential are examined in the context of Todorov's relativistic Schrodinger equation for a wide range of coupling constant sizes. These forms are characterized by an absence of coupling constant limitations in the spectrum unlike the static Dirac and Klein-Gordon equations. Very deep binding is obtained for large values of the coupling constant α. The Reggie trajectories vary as a function of α from hydrogenic or concave upward for small values of α to a near straight line forms for larger values of α (α~2-4) to near vertical for very large values of α (α~10-100). Applications of the equation to the psion spectrum on a well as the ground state meson spectrum are given. Coulomb as well as linear potentials are examined.

HC 11 Need to Explain Michelson-Morley Experiment. J. P. WESLEY, 1000 Berlin 65 Behmstr. 32. - - The transformation theory of Einstein's special theory of relativity is internally inconsistent, as discovered by bright young students every year and as evidenced by the perenial inability of mature physicists to resolve the "clock paradox". Relevant ideas that almost everyone can agree upon are: 1) A zero velocity frame is experimentally defined by an isotropic Doppler schift and an isotropic influx of radiant energy from distant stars. 2) In a zero velocity frame the momentum of a particle is $mv/\sqrt{1-v^2/c^2}$. 3) The frequency of light is not conserved, since the energy of a photon is given by the Planck-Einstein frequency condition. And 4) the principle of mass-energy equivalence is valid. The best explanation received within a year will receive a prize of $1000.

HC 12 Equivalent One-Body Equation for a Relativistic Two-Body Problem. DONALD E. FAHNLINE, Altoona Campus, Penn State U. --In Fokker's time-asymmetric relativistic two-body problem, one electrically charged particle responds to the retarded Liénard-Wiechert field of a second, while the second responds to the advanced field of the first. This paper defines the center of mass and internal variables which reduce the one-dimensional case of Fokker's problem to the standard relativistic one-body problem of a charged particle moving in the Coulomb field of a fixed charge.

HC 13 Grand Function of a One-Component Classical Charged Particle Gas Using Collective Coordinates. G. SPEISMAN, Florida State University--We develop a new expansion for the grand function of a one-component classical gas of particles whose potential energy is the sum of Coulomb plus two-bodied short-ranged interactions. We employ collective coordinates and the grand ensemble. We introduce collective coordinates in the same way we did earlier[1] in obtaining an expansion for the logarithm of the canonical partition function for a Coulomb gas. Our present results agree with our earlier results, for the case of a pure Coulomb interaction, through the first two orders of corrections to the Debye-Hückel theory. The ultimate purpose of this work is to develop a new mathematical technique for obtaining thermodynamic properties of an ionized gas from quantum statistical mechanics.

[1]G. Speisman, Ann. Phys. (N.Y.) 102, 189 (1976).

*Supplementary Program*

HC 14 Solutions of Linear Inhomogeneous Recursion Relations. ALAIN J. PHARES, University of Montana. --The general formalism recently developed solving multi-term linear homogeneous recursion relations with non-constant coefficients is extended to include the solutions of inhomogeneous linear recursion relations.

## SESSION HD: JOINT SYMPOSIUM OF THE DIVISION OF PLASMA PHYSICS AND THE DIVISION OF FLUID DYNAMICS TOPICS IN PLASMA STABILITY AND INERTIAL CONFINEMENT

**Wednesday afternoon, 27 April 1977; Palladian Room, Shoreham-Americana at 2:00 P.M.; J.L. Johnson, presiding**

HD 1. Hydrodynamic Instabilities in Inertial Confinement Fusion.* JOHN R. FREEMAN, *Sandia Laboratories.* (30 min.)
Inertial confinement fusion targets generally consist of hollow high-density spheres filled with low density thermonuclear fuel. Targets driven ablatively by electrons, ions, or lasers are potentially unstable during the initial acceleration phase. Later in time, the relatively low density fuel decelerates the dense inner portion of the sphere (termed the pusher), permitting unstable growth at the fuel-pusher interface. The instabilities are of the Rayleigh-Taylor variety, modified by thermal and viscous diffusion and convection. These problems have been analyzed by many in recent years using both linearized perturbation methods and direct numerical simulation. Examples of two-dimensional simulations of the fuel-pusher instability in electron beam fusion targets will be presented, along with a review of possible stabilization mechanisms.
*This work supported by the U. S. Energy Research and Development Administration.

HD 2. Dynamic Stabilization of the Rayleigh-Taylor Instability on the Surface of Imploding Pellets.
J.P. BORIS, *Naval Research Laboratories.* (30 min.)
By continually modulating the intensity of the driving laser beams, the fastest-growing modes of Rayleigh-Taylor instability on the surface of an imploding laser fusion pellet can be dynamically stabilized. The potentially unstable ablator shell is subjected to a strongly and rapidly varying acceleration which resonantly stabilizes a band of the Rayleigh-Taylor spectrum. By varying the frequency of the modulation (f ~ 1 cycle/nanosecond for low power ablations), the band of stabilized modes can be made to include the most unstable linear mode. Both theory and numerical simulation are presented to support this conclusion. The band of modes stabilized extends to sufficiently long wavelength that rather high aspect ratio shells apparently can be imploded successfully. Similar beam modulation or bunching techniques should work for electron, ion, and heavy ion pellet implosion schemes.

HD 3. Recent Research in Laser Plasma Theory and Experiments. WILLIAM KRUER, *Lawrence Livermore Laboratory.* (30 min.)

HD 4. Suprathermal Particles and Classical Hydrodynamics in Laser Driven Plasmas.*†
EDWARD B. GOLDMAN, *University of Rochester.* (30 min.)
Direct evidence of the presence of suprathermal particles has been observed in recent experiments in the form of $K_\alpha$ radiation, hard x-rays and α-particle emission. Suprathermal particles