GL 7 Scattering of Ultraviolet Radiation in the Lower Atmosphere', I-DATA, E.S. Fishburne, M.E. Neer and G. Sandri. A.R.A.P.--A hydrogen-xenon flashlamp and an ultraviolet detector have been used to systematically measure the overall effects of scattering and absorption in the lower atmosphere for light between 2500Å and 2700Å in the solar blind region of the spectrum. The line of sight attenuation coefficients, measured over the .82 and 2.08 km distances between the groundbased flashlamp and detector locations, were found to be consistent with previously published values. The atmospheric scattering footprints obtained by surveying the sky were observed to be symmetric with respect to the angle between the detector optical axis and the detector to flashlamp line of sight. It has been concluded that, due to both a strong preference for forward scattering and to an exponential decay with pathlength associated with ozone absorption, most of the photons reaching a given point in the atmosphere are traveling very nearly in a radial direction from the flashlamp. A light misty rain was observed to increase the detected radiation by a factor of four.

GL 8 Scattering of Ultraviolet Radiation in the Lower Atmosphere, II-Theory, M.E. Neer, G. Sandri and E.S. Fishburne. A.R.A.P.--A simplified theory based on both experimental observation and physical intuition has been developed to model ultraviolet scattering and absorption in the lower atmosphere. A groundbased detector, sensitive to light between 2500Å and 2700Å in the solar blind region of the spectrum, is assumed to be pointed at some arbitrary angle to a groundbased ultraviolet light source some distance away. The model utilizes the generalized Henyey Greenstein phase function, modified to more closely resemble Deirmendjian's phase functions for polydispersed aerosols. Multiple scattering effects are modeled by assuming the phase function to become isotropic at large distances from the light source. Two arbitrary constants, introduced to represent the unknown ultraviolet phase function, are chosen to obtain agreement with the magnitude and angular dependence of measured radiation at a given source to detector distance. Simultaneous agreement between theory and experiment for another source to detector distance, as well as for other related experiments, tend to validate the choice of constants as well as the overall model.

GL 9 Coupled Order Parameter Treatment of the Dicke Hamiltonian. R. GILMORE, Louvain-la-Neuve, Belgium, and C. M. BOWDEN, Redstone Arsenal.--The Dicke Hamiltonian is linearized by expanding the field and atomic shift operators about disposable c-number parameters. When these parameters are chosen to be the expectation values of the corresponding operators with respect to the linearized Hamiltonian, the difference between the free energy per particle of the original Hamiltonian and the free energy per particle of the linearized version is minimized and vanishes in the thermodynamic limit. The disposable parameters so chosen are order parameters for the linearized Hamiltonian and obey a system of coupled nonlinear equations characteristic of mean field theory. These equations determine the critical temperature and the ordered state behavior. An alternative, but equivalent, set of coupled self-consistent equations is derived from the order parameter equations of motion in thermodynamic equilibrium and in the thermodynamic limit. This alternative form leads to a very simple method for locating the critical temperature and determining the ordered state behavior. This method is illustrated for three different modifications of the Dicke Model Hamiltonian.

GL 10 Interpretation and Extension of the Superradiant Phase Transition. Y AHARONOV* and J. M. KNIGHT, University of South Carolina -- The superradiant phase transition is shown to be analogous to a similar transition that occurs in a collection of free harmonic oscillators when a simple constraint is imposed. The analogy permits interpretation of the condition for the existence of the superradiant transition as the condition that the corresponding set of oscillators has a negative frequency. An extension of the Dicke model of superradiance to include the polarization of the field is also discussed. This extension possesses an SU(2) symmetry which is spontaneously broken below the transition temperature. The question of the existence of Goldstone excitations is taken up.

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GL 11 Test of Charge Conservation. D. F. Bartlett, R. Clark, J. Reeves, J. Monroy and B. F. L. Ward, University of Colorado and Princeton University.--Do moving charges produce electric fields which differ from those predicted by conventional electrodynamics? Perhaps a charge e moving with velocity v produces a field of order ev^2/c^2r^2 in addition to the normal Coulomb field.[1] Perhaps a rotating bar magnet carries its lines of force with it and thus produces an electric field $E = (1/c)(v \times B)$ in the region outside the bar magnet.[2] For a number of years we have searched in vain for such fields. In our experiment current carrying coils and magnetizable materials are rotated inside a large Faraday cage; small electric fields outside the cage were saught, but not found.

[1]W. Edwards, Bull. Am. Phys. Soc. 20,630(1975).
[2]J. Djuric, J. Appl. Phys. 46, 679 (1975).

GL 12 Initial Conditions for Reflection and Refraction of Photons. J. P. WESLEY, 1000 Berlin 61, Blücherstr. 32-2L. -- Photon trajectories prescribed by Poynting's vector predict which photons are reflected and which are refracted at a plane interface in terms of ordinary classical initial conditions, the trajectories being continuous, distinct, and unique. The probabilistic, or indeterministic interpretation of the usual traditional quantum theory is not tenable. Classical wave theory can yield more detailed and precise results than traditional quantum theory; since the traditional quantum theory is restricted to time-harmonic solutions and to time-average observables. Transient experiments, where sources or boundaries change within a time comparable to the period of the wave, can demonstrate the correctness of the present theory.

GL 13 Three-Dimensional Reconstruction in X-Ray Crystallography and in Electron Microscopy by Reduction to a Two-Dimensional Holographic Implementation. G.W.STROKE and M.HALIOUA, SUNY, Stony Brook.--The reconstruction of 3-D structures in X-ray crystallography and in electron microscopy has some fundamental similarities which may be exploited in order to reduce the formidable 3-D digital Fourier-transform computation problem, as current, to a set of 2-D optical holographic implementations. The proposed "holographic 3-D reconstruction method" is, we believe, a major new step in optical reconstructions since the 1940's work of W.L.Bragg and M.J. Buerger who introduced them to crystallography, in that we show that the traditional difficulties with the so-called 'optical transforms' (which ultimately result unfortunately only in projections in the real-space structure domain) may now be surmounted by holographically con-