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Propagation of light in low pressure gas

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The criticism by W. E. Lamb, W. Schleich, M. Scully, C. Townes of a simplified quantum electrodynamics which represents the photon as a true particle is illustrated. Collisions being absent in low-pressure gas, exchanges of energy are radiative and coherent. Thin shells of plasma containing atoms in a model introduced by Strömberg are superradiant, seen as circles possibly dotted. Spectral radiance of novae has magnitude of laser radiance, and column densities are large in nebulae: Superradiance, multiphoton effects, etc., work in astrophysics. The superradiant beams induce multiphotonic scatterings of light emitted by the stars, brightening the limbs of plasma bubbles and darkening the stars. In excited atomic hydrogen, impulsive Raman scatterings shift frequencies of light. Microwaves exchanged with the Pioneer probes are blueshifted, simulating anomalous accelerations. Substituting coherence for wrong calculations in astrophysical papers, improves results, avoids "new physics".

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