is covered by a diaphragm containing two small holes having a known separation. If the separation of the holes is small compared to the size of the average patch of light, the light coming through the two holes will fluctuate in unison. Consequently the r.m.s. fluctuation of the total light coming through both holes will be twice the fluctuation of the light through a single hole. On the other hand, if the holes are much farther apart than the diameter of a patch of light, the fluctuation of the light from the two holes will be uncorrelated. In this latter case the r.m.s. amplitude of the combined light fluctuation will be only the square root of two times the fluctuation of light from a single hole.

A mathematical analysis shows that observations of this kind can give the complete autocorrelation function of shadow band intensities and the wave-length spectrum of their undulations.

From observations made at individual frequencies the combined space-time autocorrelation function can be obtained, except for an uncertainty with respect to the direction in which the pattern is moving.

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Krogdahl, Wasley S. A least-action principle in kinematic relativity.

The theory of kinematic relativity, as developed by Milne, did not permit of a formulation in terms of a minimal principle except in the case of a free particle. It is shown that without modification of any of the fundamental assumptions of the theory, the equations of motion may be recast in a form which yields a least-action principle on the dynamical time scale. The development is made to parallel that of classical mechanics and yields the Lagrangean and Hamiltonian formulations.

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Lilley, A. Edward. Analysis of the Taurus dark nebulae complex in 21 cm radiation.

The Taurus dark nebulae complex in the anti-center of the galaxy has been observed with the Agassiz Station 24-foot Radio Telescope by means of the 21 cm hyperfine microwave radiation from interstellar hydrogen. The study was

made in an effort to determine the association of gas and dust. The observations cover dust lane extensions to high southern galactic latitudes in Orion, Taurus, and Perseus, with particular emphasis on Taurus.

Three well defined "bright" areas of hydrogen radio emission are found to be coincident with the major dust lane extensions. Gas and dust optical depths, as derived, respectively, from the radio measures and Hubble's galaxy counts, show a positive correlation. No satisfactory correlation is revealed on the basis of star counts, probably because the existing counts do not go faint enough to penetrate through all the dust. Where major areas of dust exist, a strong increase in the hydrogen radio emission occurs. The scatter in the correlation is certainly in part due to the observational uncertainties. The observations are not sufficiently sensitive to ascertain secondary effects such as those arising from the formation of hydrogen molecules as suggested by van de Hulst, Muller, and Oort.¹

N_H , the total number of hydrogen atoms along the line of sight in a column of 1 cm² cross section may be determined from the radio observations. A similar quantity, N_G , the total number of grains may be determined from the galaxy counts assuming a grain size and optical properties.² The mean value of N_H/N_G in the obscured regions of Orion, Taurus and Perseus was found to be 6.6×10^{12} . The observed correlation of gas and dust strengthens the assumption that N_H and N_G are distributed over the same path length in the interstellar dust clouds. This assumption enables a determination of the ratio of the spatial densities of gas and dust. The mean value of N_H/N_G observed leads to $\bar{\rho}_H/\bar{\rho}_G = 1.4 \times 10^{-11}$. $N_H/N_G = 98$, in good agreement with other astronomical calculations. We make the apparently reasonable assumption that for this dust complex, gas and dust are distributed over the same volumetric proportions. At these latitudes, it is assumed that the average value of N_H observed in the dust regions is representative of the average value of N_H found in a 1 cm² column which passes through a dust complex such as those described by Greenstein. Accordingly, if we adopt his estimate of 65 parsecs for the diameter of the complex, a rough determination of its mass can be obtained. Greenstein's estimate of the size, and our average value of N_H , lead to a mass of approximately 21,000 $M_\odot$ for the complex. This corresponds to an average spatial density of 0.15 $M_\odot/\text{pc}^3$.