
By Tokio TAKEUTI.

(Read March 8, 1941.)

From the two cosmological equations for the flat universe with ordinary notations,

\[ \frac{3\dot{R}^2}{R^2} - \lambda = \kappa c^2 \rho_0, \]

\[- \frac{2\ddot{R}}{R} - \frac{\dot{R}^2}{R^2} + \lambda = 0, \]

we obtain the following equations:

\[ \ddot{R} = R \frac{\kappa c^2 \rho_0 + \lambda}{3}, \quad \text{(1)} \]

\[ \frac{6\dddot{R}}{R} = 2\dot{\lambda} - \kappa c^2 \rho_0. \]

By Hubble's observation we know for the velocity \( v \) of the distant nebula

\[ \frac{R}{R} = \frac{v}{R} = \alpha = 1.7 \times 10^{-17} \text{sec}^{-1}. \quad \text{(2)} \]

Hence the equation (1) becomes

\[ \frac{\dot{v}}{2} = R \frac{\frac{8\pi \gamma \rho_0 + \lambda}{6}}{R} \]

\[ = R \frac{\alpha^2 c^2}{2}, \]

for

\[ \kappa = \frac{8\pi \gamma \alpha}{c^2}, \]

\( \gamma \) being the Newtonian constant of gravitation.

If \( \rho_0 \) be the density of negative matter, represented by \( \lambda \) in the eqn. (1), we have in classical dynamics,

\[ \frac{1c^2}{2} = \gamma (\rho_0 - \rho_0) \frac{4}{3} \pi R^2, \quad \text{(4)} \]

so that we can put

\[ \rho_0 - \rho_0 = \frac{3c^2}{8\pi \gamma}, \quad \text{(5)} \]

which has the value of order of \( 10^{-28} \text{g/cm}^3 \).

The above deduction shows that, in the universe there exists ne-
On the Reflection Spectrum of Electron Waves from a Cleared Surface of NaCl.

By Tasaburo Yamafuti.

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Abstract.

Reflection spectra of electron waves from a cleaved surface of NaCl and from the surface covered with condensed crystallites of the crystal were taken simultaneously on the same photographic plate with a view to obtaining accurate values for ratio between the wave length and the spacing. The apparent inner potential is deduced from the former spectra for each order reflection. Though the inner potential, evaluated by using Uyeda's formula from high order reflections has a definite value, the value derived from the first and the second order reflections still show remarkable deviation from the definite one. An interpretation of the second order reflection led us to a conclusion that an expansion of the spacing of the surface layers is contrary to the contraction deduced from the theoretical ground by Lennard-Jones and others. Other possibilities for the explanation of the low order reflections are also discussed.

Introduction.

The inner potential of NaCl had already been determined by a few investigators\(^1\) from the reflection spectrum of electron waves from the cleavage face of the crystal. However, owing to the value of the potential to be deduced from high order reflections varying easily with slight errors involved in both the wave-length and the spacing adopted as in the case of zincblende\(^2\), these investigations are not considered sufficiently accurate for an investigation of a mode of the increase of the apparent inner potential with the reflection order.

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