

GR 18: Grundlegende Probleme

Zeit: Freitag 13:30–13:50

Raum: 30.45: 101

GR 18.1 Fr 13:30 30.45: 101

A surprisingly close relationship between gravitation and electrostatic interaction — ●KARL OTTO GREULICH — Fritz Lipmann Institute Beutenbergstr.11 D 07745 Jena

Despite their formal identity, the physical core of gravitation and electrostatic interaction is seen to be quite different. In cosmology, gravitation is thought to have separated from the other forces very early in the history of the universe. When, however, both, the gravitation constant G and the Coulomb constant are expressed in terms of Planck units it turns out that $G = k_0 e^2 / (\alpha * m_{\text{Planck}}^2)$ and the gravitational force is $K_{\text{grav}} = (1 / \alpha) k_0 e_1 e_2 / r^2$ where α is

the fine structure constant and m_{Planck} the Planck mass. The charges e_1 and e_2 can be calculated from the elementary charge e and the masses m_1 and m_2 which exert the gravitational force as $e_1 = e * m_1 / m_{\text{Planck}}$ and $e_2 = e * m_2 / m_{\text{Planck}}$. Thus it formally appears as if the gravitational force is simply an electrostatic force between (very small) residual charges e_1 and e_2 , which are narrowly correlated with the mass.

Reference K.O. Greulich Expression of the dimensionless constants of nature as function of proton and electron properties Verhandlungen der DPG 3/2006 Gr 303.1 http://www.fli-leibniz.de/www_kog (then click the symbol Phi for physics)