Particle acceleration for a stationary observer in Schwartzschild spacetime DAVID SNEAD, Saguarosoft, DAVID E. SNEAD TEAM — We explore the acceleration of a massive particle in free fall in a stationary observer' s proper reference frame in the gravitational field of a spherical body. Comparisons of the results are made between Newtonian theory and General Relativity. It is seen that the acceleration has a velocity dependence in GR which only approaches the Newtonian value as the particle speed approaches 0 (and the particle is well outside the gravitational radius of the gravitating body). The GR result shows a critical vertical velocity at $c/\sqrt{2}$ where the vertical acceleration goes to 0. The GR result is found to be $a_x = \frac{2Mv_xv_z}{r^2\sqrt{1-\frac{2M}{r}}},\ a_y = \frac{2Mv_yv_z}{r^2\sqrt{1-\frac{2M}{r}}},\ a_z = -\frac{M\left(1-2v_z^2\right)}{r^2\sqrt{1-\frac{2M}{r}}}$ which compares with the Newtonian result of $a_x = 0,\ a_y = 0,\ a_z = -\frac{M}{r^2}$ (in units where c=1, G=1).

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