Image formation in strong gravitational field: proximity of a Schwarzschild black hole's horizon

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Communication between two observers is presented. Electromagnetic signal exchanged between source (A) and receiver (B) placed (co) radially, $r_A < r_B$ in gravitational field is described in terms of General Theory of Relativity. Properties of light makes it both easiest in use and richest tool in consideration of how the observer sees his surroundings. Light signal in terms of GTR are “null geodesics”, their emission and propagation (AB) through spacetime is investigated. Source and receiver are described as massive particles, one that emits the light in all directions, another collects the emission falling on established limited area, here tools of wave optics were indispensable built in the model for seeing the record. Wide variety of cases is observed. The passage from classical spacetime described in spherical coordinates to Schwarzschild curved spacetime is presented. Stronger gravitational field arises when placing observers closer to the source of curvature which is spherical Schwarzschild black hole.

Investigation of signal exchange between two observers is extended by their free fall. Passage from static observer to radially falling is realized by usage of tools of Special Theory of Relativity. Relation between static and radially falling observers is shown.