4.4 The Resultant Red-Shift of a Source in the Case of the Merger of the Schwarzschild Space-Time with the Flat Robertson-Walker Space-Time

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ABSTRACT

The red-shift of a source in the space can be described by considering the Schwarzschild space-time [1] (gravitational red-shift) or the Robertson-Walker space-time [2] (cosmological red-shift). When obtaining expressions for the red-shift, the path of light particles or photons plays an important role [3]. In the case of merger of the isotropic Schwarzschild space-time with the flat Robertson-Walker space-time, it is not meaningful to discuss the path of light particles or photons in the isotropic Schwarzschild space-time or the flat Robertson-Walker space-time separately.

We have considered the red-shift of a source as observed by an observer on the other side of the merger. The expressions for the radial coordinates, derived by the authors [4], at the merger of the isotropic Schwarzschild space-time and the flat Robertson-Walker space-time were used.

Figure: Radial motion of a photon with the source in the flat Robertson-Walker space-time
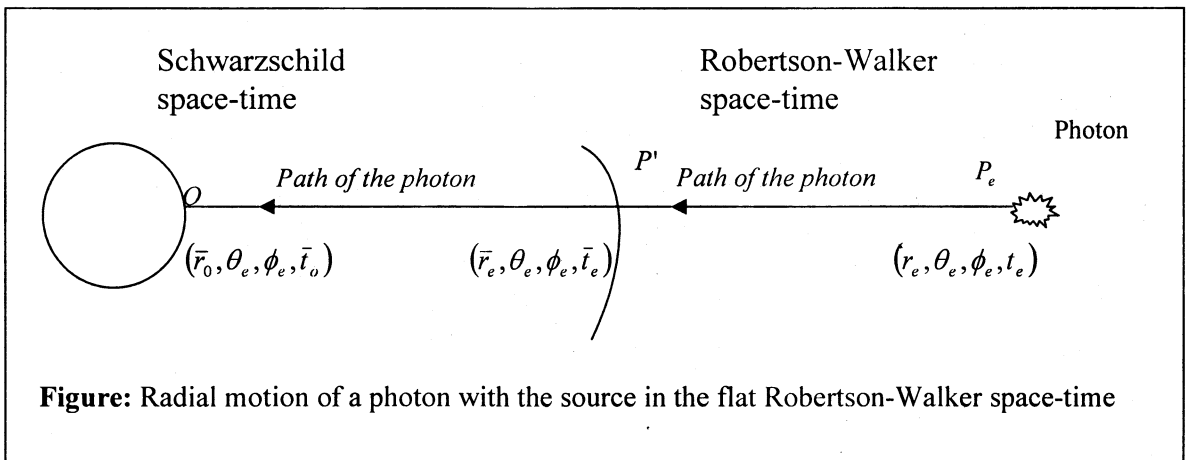
When the source is located in the flat Robertson-Walker space-time, the observer is considered to be in the isotropic Schwarzschild space-time and vise versa. The expressions for the gravitational red-shift and the cosmological red-shift of the source were derived, and the resultant red-shift of the source was obtained from these expressions.

References:

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