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# How the observational quantities of strong gravitational lens effect depend on BH's mass and spin

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According to the general relativity (GR), the black hole (BH) is characterized by three parameters: mass $M$, spin angular momentum $J$ and electric charge $Q$.
In real cases, the charge is expected to be zero, $Q = 0$.
Then, the "BH observation" may be understood as the measurement of $M$ and $J$ through a direct observation of GR phenomena, for example the strong gravitational lens effect.
I am studying how the two parameters $(M, J)$ appear in a time series data (light curve) seen by single telescope observing the strong gravitational lens effect by Kerr BH.
The situation treated in my study consists of three parts as follows:

(1) If an emission of light with short duration (burst-like emission) occurs near a BH, we focus on two light rays:
One light ray propagates from the source to observer along the shortest path which does not wind around the BH ("direct ray" or "zero-winding ray").
Another ray propagates along the secondary short path which winds once around the BH ("secondary ray" or "1-winding ray").

(2) When the observer detects the 0-winding and 1-winding rays by single telescope, he/she can (in principle) readout following two informations from the light curve seen by the telescope: the time delay $\Delta t_{obs}$ between detection time of 0-winding and 1-winding rays, and the ratio of brightness $R_{obs}$ of 0-winding and 1-winding rays.

(3) These two parameters $(\Delta t_{obs}, R_{obs})$ are determined by BH parameters $(M, J)$ and also the position and velocity $(\vec{x}, \vec{v})$ of source at the emission.

I will report how these quantities $(M, J, \vec{x}, \vec{v})$ determine the two observational quantities $(\Delta t_{obs}, R_{obs})$.
Also, it will be found that the estimated values of $\Delta t_{obs}$ and $R_{obs}$ seem to be detectable by the present telescope capability.

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