Invited lecture

SHAPES OF EMISSION LINES AND DETECTION OF BINARY BLACK HOLES

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The shapes of spectral lines emitted from Active Galactic Nucle (AGNs) can be used for investigation of the geometry and physics of emitting regions which can be very close to the super-massive black hole, as e.g. the Broad Line Region (BLR). Especially, there are groups of AGNs which lines show two peaks. Two peaks in the broad line profile in the most cases are caused by emission of an accretion disk, but two peaks in the narrow lines can indicate a binary black hole in the center of an AGN. Here we give a discussion about possibility to use the narrow and broad lines in order to find binary black holes. We also discuss some findings published recently and give several arguments pro and contra of binary black hole presence in some objects.

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SHADOWS AS A TOOL TO EVALUATE BLACK HOLE PARAMETERS AND A DIMENSION OF SPACETIME

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Measurements of the shadow sizes around the black holes may help to evaluate parameters of black hole metric (Zakharov et al. 2005). Theories with extra dimensions (Randall–Sundrum II braneworld approach, for instance) admit astrophysical objects (supermassive black holes in particular) which are rather different from standard ones. People proposed tests which may help to discover signatures of extra dimensions in supermassive black holes since the gravitational field may be different from the standard one in the GR approach. In particular, gravitational lensing features are different for alternative gravity theories with extra dimensions and general relativity. Therefore, there is an opportunity to find signatures of extra dimensions in supermassive black holes. We show how measurements of the shadow sizes can put constraints on parameters of black hole in spacetime with extra dimensions.