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Gaps in black holes magnetospheres

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We consider the possible existence and observational consequences of the so-called vacuum “gaps” in the SMBH force-free magnetospheres in RIAF type sources. The gaps are the sites with a lack of the volume charge density in comparison to the plasma-filled force-free regions of the magnetosphere. They are analogous to the gaps in the pulsars magnetospheres. In such gaps direct acceleration of charged particles by unscreened electric field could occur. It is vacuum gaps that could play an important role in the process of the plasma filling of the BH magnetosphere and because of the direct particle acceleration are also interesting from the point of view of the UHECR origin problem.

We analyse the gap properties by numerical modelling of the particle acceleration and radiation in the black hole magnetosphere, embedded into the accretion flows’ background radiation field.

We show that for the some range of the RIAF parameters there are sharp features in the radiation spectrum at GeV-TeV energies, produced by the particles, accelerated in the gaps. The observation of these features would allow to verify the discussed model.

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