

INVITED LECTURE

Black Hole Ergospheres

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Astrophysical black holes grow by accretion and mergers and therefore receive angular momentum. They are surrounded by a plasma-filled corotating region of spacetime, the ergosphere. Gravito-magnetic and ultrarelativistic collisional processes in the ergosphere give rise to a plethora of phenomena which can be studied using the methods of multi-messenger astroparticle physics and numerical simulations. Considerable progress has been achieved in understanding of the formation of Poynting-flux driven jets converting rotational energy of the black holes into relativistic particles and magnetic fields. Next-generation instruments will allow to establish a coherent picture of the role of black holes in the non-thermal Universe.