Super-Penrose process: classification of possible scenarios

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If two particles collide near a rotating black hole, their energy in the centre of mass frame E_c.m. can become unbounded under certain conditions. In doing so, the Killing energy E of debris at infinity is, in general, remain restricted. If E is also unbounded, this is called the super-Penrose process. We elucidate when such a process is possible and give full classification of corresponding relativistic objects for rotating space-times. In particular, we show that it is possible for rotating wormholes.

We also discuss briefly the case of a pure electric super-Penrose process that is valid even in the flat space-time. The key role in consideration is played by the Wald inequalities.

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