Collisions of Spinning Particles in a Schwarzschild Background

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\[ G_{\mu\nu} - \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} \]

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Texas Symposium Dez 2015
Background:
High center of mass energies are interesting (new physics)

- Black holes can in principle produce $E_{CM} \to \infty$, but one needs
- Extremely rotating black hole
- Collision at the horizon
- Angular momentum $l$: critical

$\Rightarrow$ Unlikely, hard to observe
Idea:
Let the particle rotate and the black hole be spherical

- Can one produce $E_{CM} \to \infty$?
  If yes:
- Has the collision to be at the horizon?
- Has the angular momentum $l$: to be critical?
- Is there a notion of extremely rotating particle?

$\Rightarrow$ Solve Papapetru equations and see ...
Result-plot

Result-1:

$E_{CM}$ divergent for yellow region
Result-summary:

- One can produce $E_{CM} \rightarrow \infty$
- Even outside the horizon
- Even for range of angular momentum
- Is there a notion of extremely rotating particle? $\Rightarrow$ Yes, kind of.

$\Rightarrow$ More interesting stuff found: see arXiv:1511.04429, or poster, or ask

Time is up, thank you!