Gravitational waves from a spinning particle orbiting a Kerr black hole

Poster II-6

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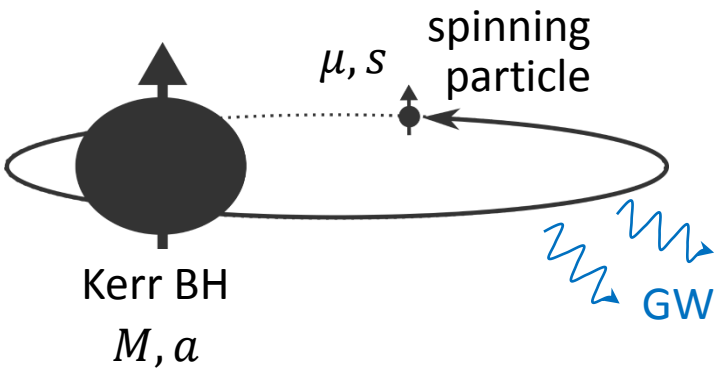
Consider the GW from a spinning particle moving in Kerr geometry.

Setup



- Circular, equatorial orbit
- Spin-aligned case (→ No precession)

Result

$$\left\langle \frac{dE}{dt} \right\rangle_\infty = \frac{32}{5}\left(\frac{\mu^2}{M^2}\right) x^{10} \times \left\{ 1 - \frac{1247}{336} x^2 + \left(-\frac{11}{4} q - \frac{5}{4} \hat{s} + 4\pi \right) x^3 + \left(\frac{33}{16} q^2 + \frac{31}{8} q\hat{s} - \frac{44711}{9072} \right) x^4 + \left(-\frac{59}{16} q - \frac{13}{16} \hat{s} - \frac{8191}{672} \pi \right) x^5 + \left[-\frac{1712}{105} \gamma - \frac{3424}{105} \ln 2 - \frac{65}{6} \pi q + \frac{611}{504} q^2 + \frac{16}{3} \pi^2 - \frac{1712}{105} \ln x + \frac{6643739519}{69854400} + \left(-\frac{467}{56} q - \frac{31}{6} \pi \right) \hat{s} \right] x^6 + \left[\frac{162035}{3888} q - \frac{71}{24} q^3 - \frac{16285}{504} \pi + \frac{65}{8} q^2 \pi + \left(\frac{63}{4} \pi q + \frac{9535}{336} - \frac{95}{24} q^2 \right) \hat{s} \right] x^7 + \left[\frac{232597}{4410} \ln x - \frac{47385}{1568} \ln 3 + \frac{22667}{4536} q^2 + \frac{39931}{294} \ln 2 - \frac{323105549467}{3178375200} - \frac{359}{14} \pi q - \frac{1369}{126} \pi^2 + \frac{232597}{4410} \gamma + \frac{17}{16} q^4 + \left(4q^3 - \frac{248803}{9072} q - \frac{7163}{672} \pi \right) \hat{s} \right] x^8 \right\}$$

... and more.
Too long to show all the terms.

See Poster II-6 in Y206 for further details.