The Schwarzchild metric:

Due to the fact that light doesn’t experience proper time, we can simply set this equation to 0 to get the optical metric:

We can use this as a Lagrangian and solve for the equations of motion:

To simplify things for us, we can start by looking for conserved quantities. If we look for the acceleration along the azimuthal axis, we can see a rule for conservation of momentum:

We can also look at the angular momentum along the other angular axis:

From here we can show the radial acceleration equation:

In the code we can use the equations above to