The One Ring

1. The first thing would be to set up the spectral analysis. I suspect that this should be similar to what can be done for Schwarzschild, although I'm not sure whether we would need Gevray spaces. Ideally, the only tools you would need are redshift estimates and the ∂_t estimate. (I don't think this is necessary since we are only interested in studying growing modes.)

2. With the spectral theory, we want to see ideally that the black string mode is isolated (it is part of the point spectrum). This could be seen by proving some Fredholm property of the resolvent (or by basic spectral theory if the problem allows for that).

3. The next step is to study the perturbation theory, here, I think the main difficulty will center around the fact that we need to make sure that perturbing a true mode generates a true mode. We know that the harmonic gauge constraint is propagated by a wave-type operator, so the modes there can be perturbed in a good way. For the pure gauge modes, we should see if theres a way to use the W_{tztz} condition.

4.