Results so far

I successfully ran a numerical relativity simulation of the merger of two identical black holes on quasi-circular orbits following the evolution of the system over the final 1.5 orbits, using the Einstein toolkit on the campus cluster at UIUC.

I am currently working on extracting the gravitational waves, emitted during the merger, from the output files containing the Weyl scalars obtained from the simulation, using a Python program.

I expect to obtain plots of the merger and ringdown gravitational waveforms produced during the event and then compare it to the waveform generated by the approximate Post-Newtonian + Implicit Rotating Source model that I previously developed with Eliu Huerta. This model has already been tested to be perfectly accurate for systems having zero eccentricity.

Following this, I will attempt to modify the parameter file to reproduce the first gravitational wave detected by LIGO (GW150914) and possibly future detections. If successful, I will publicly release the source code so that anyone can freely install the Einstein Toolkit and run this simulation to reproduce the observed gravitational waveform.

Finally, I will extend the code to simulate gravitational waves emitted by binary black hole systems having significant orbital eccentricity prior to the merger. Then, I will use these simulations to validate the gravitational waveforms from eccentric binary black-hole systems generated by the approximate model mentioned earlier.

This is really the most minimal possible report and doesn't really constitute a draft. As such I will not mark corrections. In your final paper I expect to see claims such as "This model has already been tested..." supported by documentation, either of your own work or via citations from the literature. I also expect to see detailed documentation of the production runs — initial and boundary conditions, input parameters, resolution, etc. — just as in a regular scientific paper.