

# My confused and incomplete journey from CPUs to GPUs.

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- 1980s: [...still working on it...]
- 1990s: [...this is really hard...]
- 2005: We've solved it!

# BAM

- Bernd Bruegmann, “bifunctional adaptive mesh” (BAM), 1997.  
Grazing collision of two black holes.
- Rewritten in 2003 & 2006
- Mesh refinement with moving boxes that track BHs.
- 6th-order spatial finite differencing  
RK4 time-stepping  
MPI parallelisation  
21 pdes converted to C via Mathematica scripts.

# BAM

- From 2010, BAM used to produce 100s of BBH simulations, to produce GW signal models.
- 2015: “PhenomPv2” model used to analyse first GW detection, GW150914
- Succession of “first” models (higher modes, precession tuned to NR simulations, mode asymmetries) based on BAM simulations.
- BAM simulations have contributed to all GW measurements to date.

# Why change?

- Code has remained competitive for 20 years
- We now need much greater accuracy and efficiency... time for a new code?
- And GPUs are taking over...
- Considering multiple codes
  - Einstein Toolkit (ET).
  - GRChombo/Teclyn.
  - BAM! (GPU efforts in Jena/Potsdam)

# Under the hood of a GPU-resistant PI

[ Only spoken out loud in moments of extreme inebriation or hubris\* ]

- “I don’t have enough people to port my code”
- “I want to write papers, not programs”
- “I inherited this code and I have no idea how to write a new code and I’ve survived two decades without having to change so I’m sure I can manage another two decades and still retire without having to give up and become a college dean.”

[\* so actually quite often]

Questions?