

Title: Capra Wrap-up, and the road ahead

Speakers: Bernard Whiting

Collection: The 24th Capra meeting on Radiation Reaction in General Relativity

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Abstract: In the last quarter century, Capra has grown from a mere handful of people to a fully international meeting, which now represents a large diversity of interests. In that time, much progress has been made: many aspects of the first order problem are now in hand, and a multitude of techniques has been formulated for eventually use in full EMRI waveform generation. Yet, much needs to be done, most notably at second order. In Capra meetings of the past, we have often recognized the need to reach out to the younger generation. I think efforts in that direction have clearly been effective. At some Capra meetings, specific problems have often taken focus, both in discussions at the meeting, and in the work that evolves over the coming year. From experience, we know this approach has also clearly paid off. From the discussions that have taken place here, we need to go forward with specific goals for the year ahead, drawing wherever possible on the diversity we now have before us. Great things can be achieved if great problems are tackled. What have we formulated to work on as a community together before we can meet again in 2022?

Capra Wrap-up

Bernard Whiting (University of Florida)
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(Virtual) Capra 24, June 7-11, 2021

Why am I giving this talk?

- I'm unknown to many, but ...
- I began attending Capra Meetings in 2001
- Attended 18 Capra Meetings, given 19 talks
- Co-hosted 2008 Orléans Capra & Summer School
- Co-organized 2010 joint NRDA-Capra meeting at PI
- I started doing wrap-ups in 2003 (what else to say?)

Outline

- Historical perspective
- Recent changes
- Where have we come from?
- Where are we now?
- Where are we going?
- How can we get there?

Historical perspective

- Capra began when a LISA mission appeared possible
- Its purpose was (and is) to deliver waveforms for EMRIs
- At my 1st Capra meeting in 2001, there were about 22 attendees, including 2 females, 1 who officially spoke
- Many successes behind us (ell=0,1, 1st order, tests, etc)
- 2021: 236 attendees (44 Institutes), 10 women speakers
- We recognize that we face many hard challenges ahead

Recent changes

- An online presence seems a future necessity
- Our community now has its own EDI team
- Tremendous presence of young researchers
- Are we becoming like a collaboration (must we)?
- Some of us are members of LISA, or Kagra/LIGO/Virgo
- 130 (176) at talks, ~65 in discussions, < 20 participating

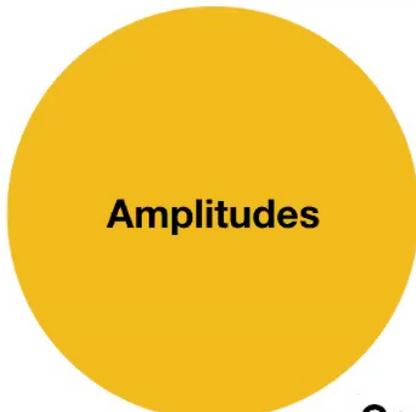
Where have we come from?

- Twenty years ago, it seemed important to get on to Kerr
- Can compare gauge invariants between SF, PN, and PM?
- We have some understanding of geodesics, resonances, transition to plunge, 1SF effects, 2SF sources, barriers ...
- We can compare with gauge invariants from amplitudes
- We have grown in number and diversity
- We have learned how far behind we are

Where are we now?

- We are in a position to bring some efforts together
- More and more focus on finishing Schwarzschild
- Enriched by a diversity of interests, and skills
- Now many more institutes represented here than there were people at early Capra Meetings
- This Capra meeting ~ half the size of Virgo Collaboration
- In process of growing, becoming more efficient/productive

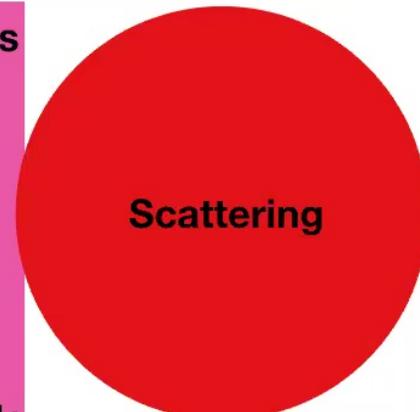
Data analysis



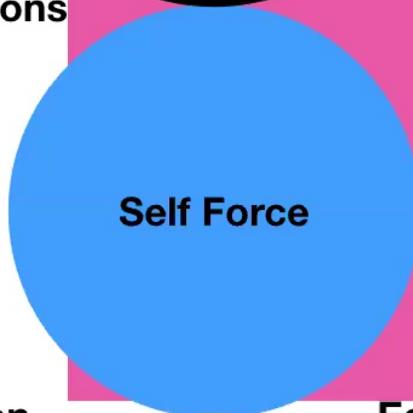
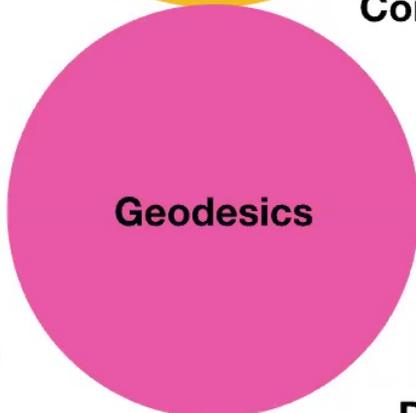
Tides



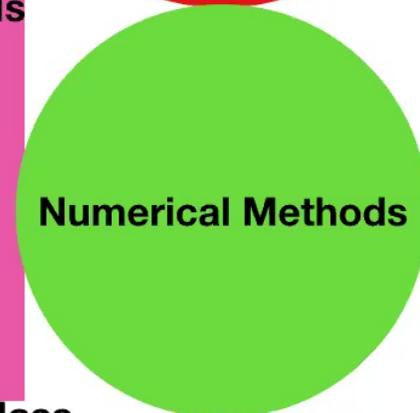
Rates



Comparisons

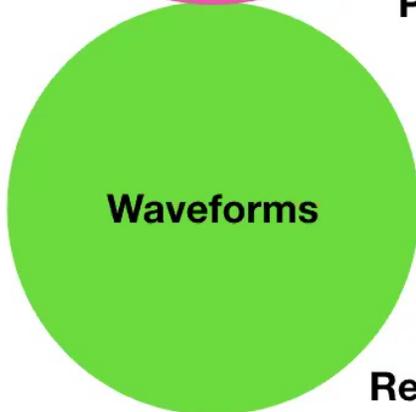


EMRIs

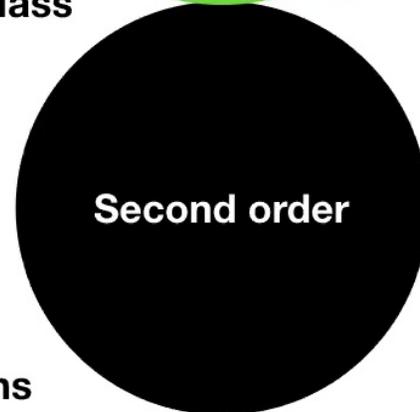
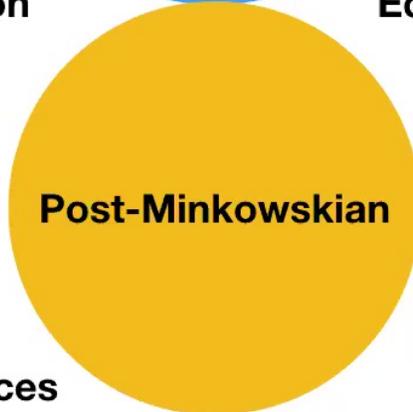


Parameter estimates

Precision



Equal Mass



Resonances

Origins

Where are we going?

- We are going into countdown and we must strategize for it!
- Need more discussions where we ask: How can we help, what is now needed, what would improve what we have?
- LISA working groups can help focus our efforts
- Are more regular meetings throughout the year, each on a subset of topics, becoming essential?
- Need to develop a timeline for all to see and respond
- Need to be able to identify and avoid potential show stoppers

How can we get there?

- Barack is frustrated, Pound is sounding the alarm:
- Random walks are too slow for the progress we need
- We must organize: workshops, code base, connected
- With talent here we can make better progress together
- Make much better use of the person power we have
- Determine and obtain the person power we need

Summary

- Proposed comparison of waveforms:
 - timely, important, essential
- Many-fronted progress - could be better coordinated:
 - analytical, conceptual, numerical, theoretical
- Can/should LISA workgroup chairs "recruit" from Capra?
- Examine how to host more effective discussions

Questions

- Should we have a code workshop for junior members?
- Should we have intermediate meetings on some topics?
- Should we have a strategy component to future Capras?
- How could we make discussions be more productive?
- Should we define/manage our relationship with LISA?
- Can we introduce a better way to stay more connected?
- Could we invest more heavily in developing code databases?