Capra roundup: perspective and prospects

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Outline

- Why are we here?
- Where have we come from?
- What are our achievements?
- Where are we now?
- Where are we going?
- How will we get there?

Connection with UNC?

- Wheeler (1935-8) => Regge-Wheeler Equation
- DeWitt (1956-1971) DeWitt-Bhreme (1960) => UT, Austin
  - Christensen (1971-1975) - QFT and regularization
  - 1957 Meeting: Estabrook => JPL <= Detweiler (1980's)
  - York (1973-2002)
    - BFW (1986-9) => UF, Gainesville <= Detweiler (1982-2016)
  - Evans (1989-…) 20th Capra Host
  - Christensen (1990-…) - MathTensor <= bitensor expansions

Our Universe
- About Space Science
- ESA's 'Cosmic Vision'

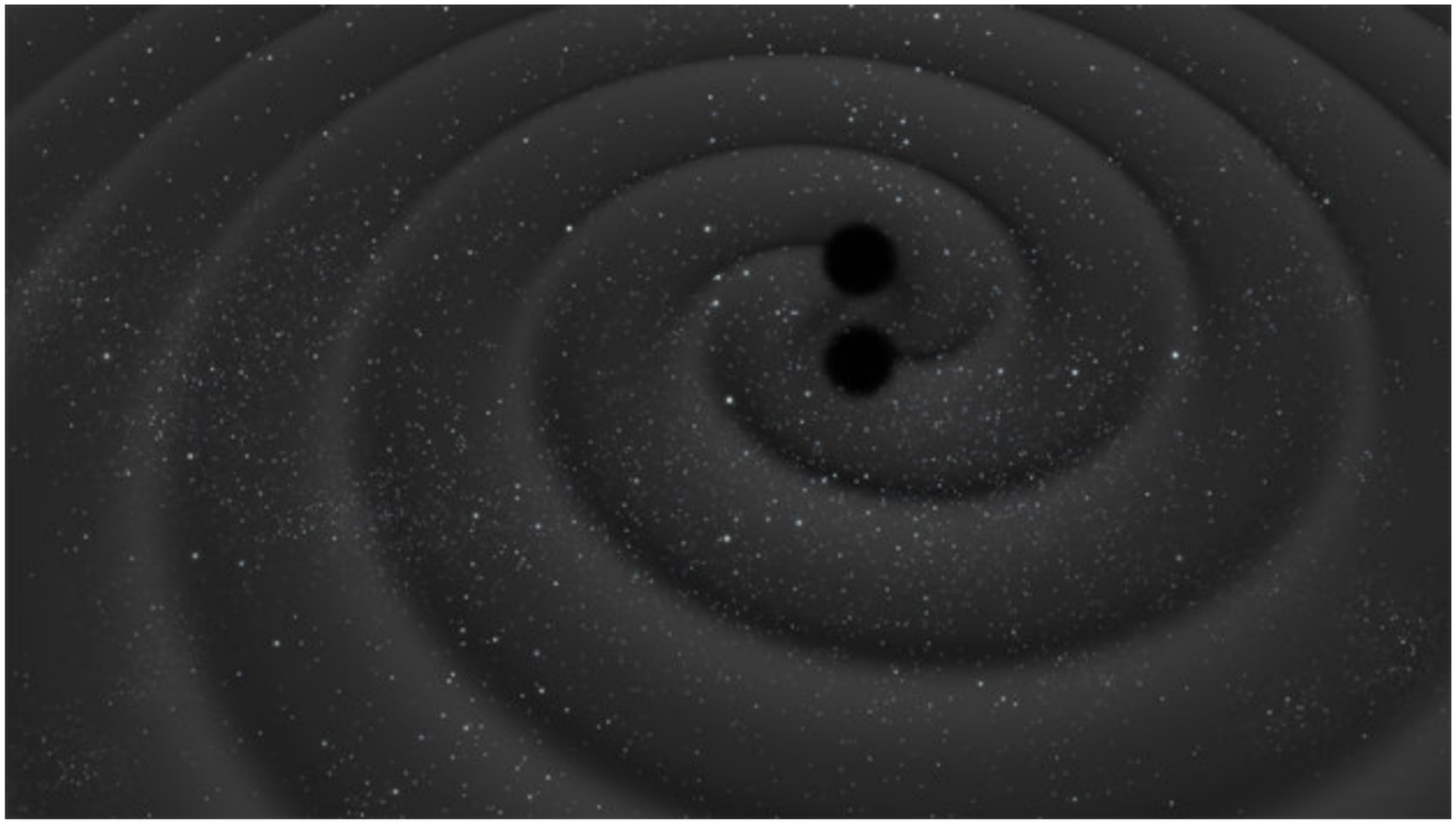
Science missions
- Mission navigator

Target groups
- For Media
- For Scientists
- For Kids

Multimedia
- Science images
- Science videos
- Science poster
- Animations
- Downloads
- Sounds from space

Resources
- Reference section

Services
- FAQs



Merging black holes

GRAVITATIONAL WAVE MISSION SELECTED, PLANET-HUNTING MISSION MOVES FORWARD

20 June 2017 The LISA trio of satellites to detect gravitational waves from space has been selected as the third large-class mission in ESA's Science programme, while the Plato exoplanet hunter moves into development

Search here

More about...
- ESA's 'Cosmic Vision'
- Defining the Cosmic Vision
- How a mission is chosen

In depth
- Cosmic Vision in depth
- PLATO in depth
- LISA in depth
- More about Proba missions

Why are we here?

- Waveforms for LISA
  - Generic regularization
  - Generic orbits in Kerr
  - Effective source description
  - Sufficient accuracy (2nd order)
- Scientific Challenges
  - Perturbations of black holes
  - Try out and implement new ideas
  - Interact with other disciplines

Where have we come from?

- 20 yrs of annual meetings, 35-65 attendees
- The Frank Capra Ranch (1998), initiated by:
  - Kip Thorne's push for EMRI waveforms
- Rooted in the gravitational wave quest
- Connected to 1957 Chapel Hill Meeting

Historical Perspective

- Sixteen years ago, fewer than 20 Capracoons
  - All working on effectively the same thing
- Now there are more than 40 here
  - Come from diverse research areas
- Some are away, more are coming to join us
- Capra has come of age & is being recognized
  - Focus issue of CQG (recognizing GW detection)

Major Achievements!

- Regularization parameters for the self-force
- Understanding gauges, role of ℓ =0,1 modes
- Identification of singular and regular fields
- Comparison with Post-Newtonian
- Transition from frequency to time domain
- Contributions with NR to EOB analysis

Recent advancements

- Automated computation for regularization
- Understanding Green's function properties
- Renewed contact with Numerical Relativity
- Advances with field theory methods
  - Role of singular + regular decomposition
- Confirmation with an element of rigor

What are our achievements?

- Renormalization Group comes to Capra
- Second order well on its way, finally
  - Even harder that we expected
- Regularization for accelerating particles
- Numerical/self-force integration emerging
- Contributions to Post-Newtonian approach
- First Law becoming very productive (NR, EOB, etc)
- Beginning to fill in the IMRI gap

Where are we now?

- Have been proceeding via random walks
- Have a co-operative, friendly atmosphere
- Have started putting pieces together
- Can celebrate, then focus on calculations
- Must be ready for a launch in 17 years

Where are we going?

- Capra will probably grow (slowly, best)
- Become more visible to other communities
- May then become more fundable
- Start talking about deliverables eventually
- Keeping co-operative, efficient atmosphere!

How will we get there?

- Many overlapping groups of individuals
- Sharing expertise, importing new ideas
- Having a modicum of organized planning
- Using different approaches and methods
- With infinite patience and understanding!