
Past, Present, and Future of GR: with emphasis on observations

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Past successes

Besides the “classic tests”, the “space tests” (e.g., Shapiro delay, gyro effects), and “lab tests” (e.g., EP, $1/r^2$), we should celebrate our understanding of these amazing observations:

- Expanding universe, from Hubble to the CBR (through COBE/WMAP/Planck results)
- Gravitational waves, from Hulse/Taylor/Weisberg through LIGO
- Black holes: XRBs and AGNs, LIGO’s coalescing binaries

Current puzzles

Let's face it: cosmology is fraught with mysteries! Here are things that we just don't understand:

- Matter/anti-matter asymmetry
 - Dark matter
 - Dark energy
 - Fine tuning (are inflation/multiverse really solutions?)
- “New physics” is everywhere!

Future opportunities

- Make precision measurements of black holes to test details of GR predictions.
 - QNM's
 - EMRI's
- Observe the Planck-era universe through gravitational wave signatures in
 - CMB polarization
 - Stochastic background of gravitational waves
- Detect dark matter
- Understand dark energy
- ... serendipitous discovery of any new phenomena ...