



Oregon State University

2021 update

Xavier Siemens



Oregon State
University

Team & recent news

- About 15 undergraduates, 2 high school students, 6 graduate students, 2 faculty (XS, Davide Lazzati)
- Renewed NANOGrav PFC (2021-2026), Oregon State is lead institution, supports NANOGrav efforts of 3 institutions at this meeting!
- PFC institutional support: OSU be making 2 GW astrophysics faculty hires, starting 1st search this Fall; also looking to hire 2 postdocs

Projects

- To increase the number of pulsars timed in NANOGrav: about 15 undergraduates and 2 high school students involved in pulsar searching using Green Bank Telescope and Arecibo (up to Dec 2020).
- Small number of undergraduates also do gravitational-wave research: including noise budget analyses of NANOGrav data, solar system ephemerides, stochastic background (GWB) searches, ...
- Graduate students generally work on GW searches in pulsar timing data:
 - Participated in 12.5-yr GWB analysis (Laal, Sun)
 - Heavily involved in 15-yr GWB analysis (Case, DeGan, Kokoris, Laal, Sun, Taylor)

PHYSICS

Galaxy-Size Gravitational-Wave Detector Hints at Exotic Physics

Recent results from a pulsar timing array, which uses dead stars to hunt for gravitational waves, has scientists speculating about cosmic strings and primordial black holes

By Adam Mann on February 3, 2021



Representative illustration of Earth embedded in spacetime that is deformed by the background gravitational waves and its effects on radio signals coming from observed pulsars. Credit: Tonia Klein NANOGrav

The fabric of spacetime may be frothing with gigantic gravitational waves, and the possibility has sent physicists into a tizzy. A potential signal seen in the light from dead stellar cores known as pulsars has driven a flurry of theoretical papers speculating about exotic explanations.

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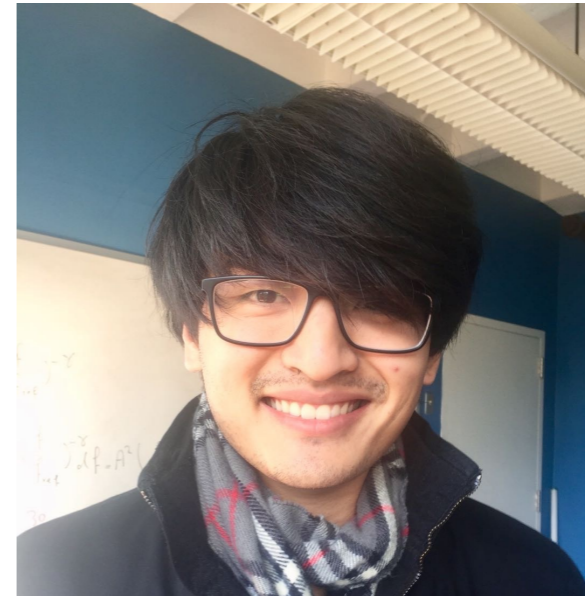
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Projects

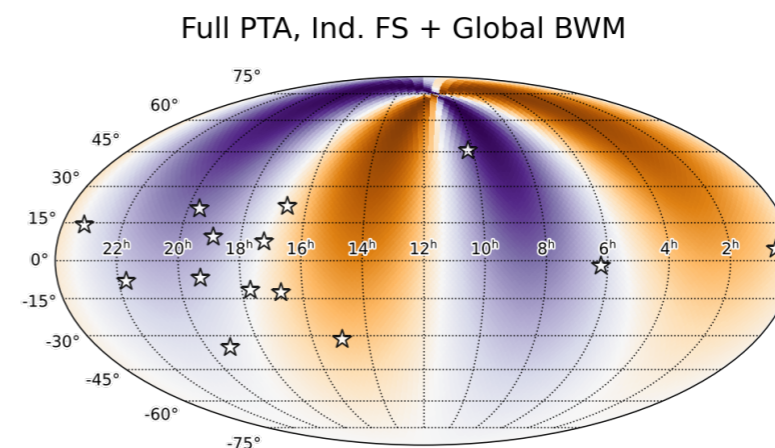
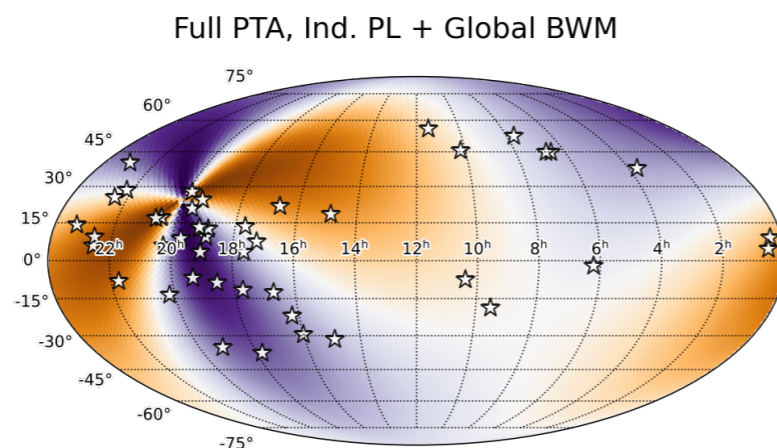
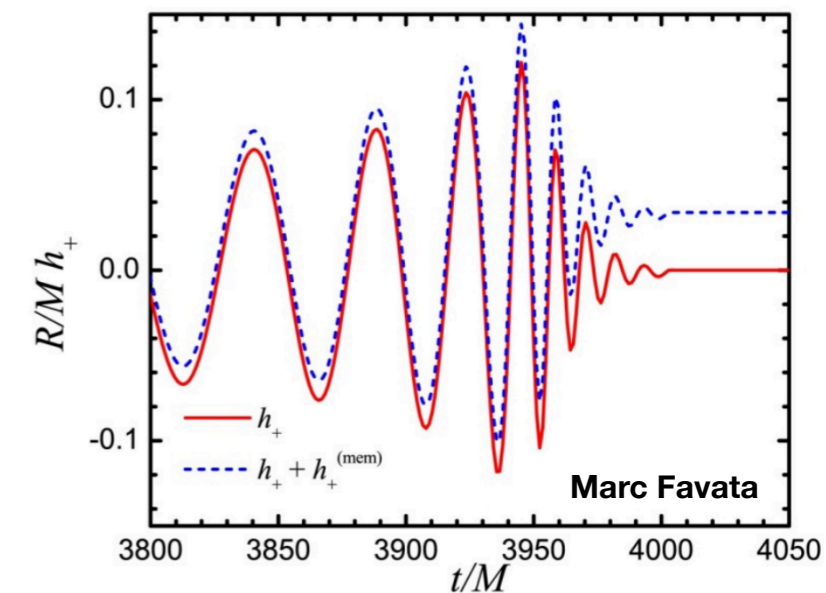
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Bursts with Memory

Jerry Sun



- Offset in metric perturbation produced in final stages of GW events—very generic
- Leading the flagship NANOGrav BWM 12.5-yr analysis and improving computational efficiency of BWM searches in PTA data



Modified Gravity

Nima Laal



- Explanations for problems like dark energy, dark matter, and attempts to reconcile QM and gravity often involve modifications to GR
- These theories can show up in our data as up to 4 additional polarizations (beyond the + and x modes of GR)
- Leading the NANOGrav 12.5-yr GWB flagship search for non-Einsteinian polarization modes (paper using NANOGrav 12.5-yr data: Chen et al 2021 <https://arxiv.org/pdf/2101.06869.pdf>).

