



Contribution ID: 70

Type: **Oral Presentation**

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Tuesday, 10 July 2012 15:30 (20 minutes)

Abstract content
 (Max 300 words)

There exist several alternative theories of gravity, all which can be compared to General Relativity (GR). The Brans-Dicke (BD) theory of gravity was compared to the elegant predictions of GR for several binary systems, including systems with large and small companion stars, it was found that in certain cases the BD theory approximates the observed change in orbital period more accurate than GR, since the BD theory takes into account the gravity dipole element between companions having different masses, but more binary systems need to be investigated to clarify this phenomena. A MAPLE driven pipeline was developed to calculate all the relevant tensors for the Post Newtonian approximation of flat space, calculating the Post Newtonian flat space metric tensor, the mass energy tensor, the gravity tensor, and the gravitational wave radiation for binary systems. It was found that the all the pipeline driven calculations corresponds to that calculated by Walter Petri(1979-1991), and application of this theory to the Binary system PSR 913+16 predicts exactly what was predicted by the General Theory of Relativity, future implementations could be the usage of NEWSOR for higher order approximations(such as Post-Post Newtonian). The Post Newtonian gravity theory was used to investigate the magnitudes and signatures of Super Nova core bounce, and several signal extraction MAPLE pipeline were developed to calculate the maximum energy released during core bounce and the detectability of this signal. One of the possible remnants of specific progenitors is the universe's strongest magnet and a possible strong GW emitter; Magnetars are exotic Super Nova remnants with an incredibly strong magnetic field produced by a dynamo rotational mechanism of the core, this magnetic field causes the star to deform (prolating or oblatting) and when rotating it emits GW energy, subsequently tending to an equilibrium state. The mechanisms responsible for spin-down were investigated, the dependence of the signature and the detectability of the GW waves on these mechanisms were clarified, the GW signal signatures of young Magnetars, both with and without the dipole radiation mechanism were investigated, and it was found that the dipole radiation mechanism drives the GW signature and the spin down, when Magnetic winds are ignored.

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Main supervisor (name and email)
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Yes

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Session Classification: Astrophysics

Track Classification: Track D1 - Astrophysics