

November 30, 2005

The Honorable Dr Brendan Nelson

Minister for Science,
Parliament House, Canberra, Australia

Dear Dr Nelson,

I am writing you, on behalf of the Gravitational Wave International Committee, to urge you to support the further development of the Australian International Gravitational-wave Observatory (AIGO).

The Gravitational Wave International Committee (GWIC: <http://gwic.gravity.psu.edu>) was formed in 1997 by the directors of the large gravitational wave detector facilities to facilitate international collaboration and cooperation in the development of experimental gravitational wave science. It is affiliated with the International Union of Pure and Applied Physics as a sub-committee of IUPAP's Particle and Nuclear Astrophysics and Gravitational International Committee (PaNAGIC). It plays, for experimental gravitational wave science, the same role that the International Committee for Future Accelerators (ICFA) plays for experimental particle physics.

Gravitational wave observations hold the potential to revolutionize our understanding of the universe. What we know of the cosmos today arises almost exclusively from observations made in the electromagnetic spectrum; however, some of the most important phenomena of fundamental physics – e.g., the catastrophic transformation of spacetime when two black holes coalesce – have no electromagnetic signature and can only be observed in gravitational waves. Additionally, some of the most energetic cosmic phenomena – e.g., the violent formation of a black hole as a pre-cursor to a gamma-ray burst, or the collapse and bounce of a stellar core as the pre-cursor to a supernova explosion – are difficult or impossible to observe electromagnetically, but have clearly visible gravitational wave signatures. Understanding these energetic phenomena is central to understanding the origin of stars like our own and the chemical elements from which Earth, and us, are made. Gravitational wave observations will permit us to pierce the veil that shrouds these phenomena from our direct observation and understanding.

Gravitational wave detection is an extremely challenging enterprise, which has engaged a large, worldwide community of scientists. We have been fortunate that the field has developed as a truly international effort, with scientific and technical collaboration and cooperation at all levels. Our Australian colleagues are fully integrated into this enterprise and have, over the last ten years, made important contributions to the development of the detectors currently operating, as well as those under development.

Beyond their contributions to the efforts to other projects, however, is the unique contribution that a large gravitational wave detector located on the Australian continent can have to the use of gravitational waves as a tool of astronomical discovery. A prerequisite for using gravitational wave observations as a tool of astronomical discovery is the ability to localize sources on the sky. A single gravitational wave detector can't be "pointed": accurate determination the sky location of gravitational wave sources requires an array of detectors separated by great distances. A large detector on the Australian continent would make a significant, qualitative difference in the science

we can do with gravitational wave observations.

The AIGO project has been under development for ten years and the AIGO facility in Gingin is doing important work in collaboration with detector projects in the United States (LIGO), Europe (Virgo and GEO) and Japan (TAMA and LCGT). A large detector on the Australian continent, operating as part of a global array of detectors, would have a large and positive impact on the science we can do with gravitational wave observations. On behalf of GWIC I urge you to support the AIGO project's continued work and, particularly, the development of a major gravitational wave observatory on the Australian continent.

Respectfully yours,

Professor Massimo Cerdonio

Chair, Gravitational Wave International Committee

MC/lst

cc: michael.bryson@dest.gov.au