## TIPP 2011 - 2nd International Conference on Technology and Instrumentation in Particle Physics



Contribution ID: 459

Type: Oral Presentation

## Seismic attenuation technology for the advanced Virgo gravitational wave detector

*Thursday 9 June 2011 17:30 (20 minutes)* 

The current interferometric gravitational wave detectors are being upgraded to what are termed '2nd generation' devices. Sensitivities will be increased by an order of magnitude and these new instruments are expected to uncover the field of gravitational astronomy. A main challenge in this endeavor is the mitigation of noise induced by seismic motion. Detailed studies with Virgo show that seismic noise can be re-injected into the dark fringe signal. For example, laser beam jitter and backscattered light noise limits the sensitivity of the interferometer.

We will focus on short superattenuators based on compact inverted pendulums in combination with geometric antisprings in order to obtain at least 40 dB ( > 10 Hz) of attenuation in six degrees of freedom. Low frequency resonances (< 0.5 Hz) are damped by using an elaborate control system based on input from LVDTs and accelerometers. Such systems are under development for the seismic attenuation of optical benches operated both in air and vacuum. The design and realization of attenuator and control systems will be discussed, while performance and commissioning results will be presented. We also describe how future implementation of similar seismic attenuation technology will improve advanced detector designs.

Authors: BEKER, Mark (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands); BLOM, Mathieu (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands)

**Co-authors:** HENNES, Eric (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands); MUL, Frans (VU University Amsterdam, Amsterdam, The Netherlands); Dr BULTEN, Henk-Jan (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands. VU University Amsterdam, Amsterdam, The Netherlands); Prof. VAN DEN BRAND, Johannes (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands. VU University Amsterdam, Amsterdam, The Netherlands); DOETS, Martin (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands)

Presenter: BEKER, Mark (Nikhef, National Institute for Subatomic Physics, Amsterdam, The Netherlands)

Session Classification: Astrophysics and Space Instr.

Track Classification: Astrophysics and Space Instrumentation