Astroparticle Physics European Consortium

February 2016

REMINDER

APPEC TOWN MEETING 6-7 APRIL 2016

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Direct detection of gravitational waves celebrated

One century after Einstein's prediction, half a century of constant cutting edge technological innovations and the tenacity of a world-wide community hunting for gravitational -waves have paid off: the first gravitational wave passing through Earth was detected on September 14, 2015 at 09:50:45 UTC! The announcement was made on 11 February by the LIGO Scientific Collaboration and the Virgo Collaboration using data from the two LIGO detectors and made headlines worldwide. The results have been accepted for publication in the journal *Physical Review Letters* and a number of companion papers have also been released.

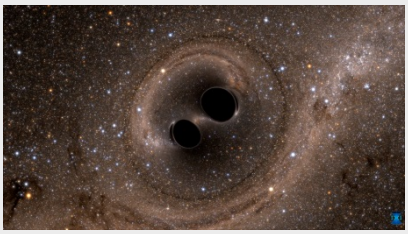

image: The SXS (Simulating eXtreme Spacetimes) Project

APPEC Chair Frank Linde said: "It is with tremendous pleasure that I congratulate the LIGO-Virgo Collaboration on this monumental achievement. For sure this will prove to be a turning point in astronomy and cosmology as well as in fundamental studies of the poorest known fundamental force in Nature: Gravity. Collectively we just acquired a new tool: gravitational waves – the power of which we are all very eager to explore.

"Personally, I can hardly believe the extraordinary beauty and the wealth of information hidden in the 0.2 second long 'ripples' recorded by the two laser interferometers located in Hanford (WA) and Livingston (LA). Each one alone recorded the tell-tale signal of the coalescence of two massive objects (most likely black holes) as well as the subsequent ring-down signature of the merged black hole. Corrected for propagation delay (few milliseconds) and relative detector orientation, the two signals are perfectly consistent and a huge treasure trove for our scientists as already witnessed by the released publications and, I am sure, by the flood of publications to appear in the coming months.

"Regarding APPEC, Astroparticle Physics European Consortium, this first detection of a gravitational wave could not come at a better time since we have just scheduled a Town Meeting in the Grand Amphithéatre de Sorbonne in Paris on 6-7 April 2016 to discuss our new European Roadmap of Astroparticle Physics This discovery puts discussions on next generation gravitational-wave detectors like the Einstein Telescope centre stage!"

The announcement made headlines on all the major networks around the world within minutes and there were tens of thousands of interactions on social media.

LISA Pathfinder releases test masses

While gravitational waves on Earth were making headlines, the preparations for potential gravitational wave detection in space continued. LISA Pathfinder will begin its science mission on 1 March after arriving at L1 and releasing the two test masses. The spacecraft, launched on 3 December, is testing key technologies for a future mission. LISA Pathfinder reached its operational orbit at the L1 Lagrange point in January. In the past two weeks, the test masses have been released in two stages. From next month the spacecraft will begin measuring the separation of the target masses to prove the concept and technology for future spacecraft that would work together across much larger distances.

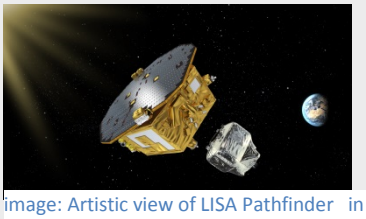

image: Artistic view of LISA Pathfinder in space. Credit: ESA-C.Carreau

KM3NeT 2.0 Letter of Intent

image: http://www.km3net.org

Scientists from the KM3NeT Collaboration have publicly announced KM3NeT 2.0, their ambition for the immediate future to further exploit the clear waters of the deep Mediterranean Sea for the detection of cosmic and atmospheric neutrinos.

The published Letter of Intent details the science performance as well as the technical design of the KM3NeT 2.0 infrastructure. The two major scientific goals of KM3NeT 2.0 are the discovery of astrophysical sources of neutrinos in the Universe with the KM3NeT/ARCA detector and the measurement of the neutrino mass hierarchy using atmospheric neutrinos with the KM3NeT/ORCA detector.

The KM3NeT scientists estimate that with the ARCA detector installed at the KM3NeT-It site south of Sicily, Italy, the observation of the cosmic neutrino flux reported by the IceCube Collaboration will be possible within one year of operation. With the ORCA detector installed at the KM3NeT-Fr site south of Toulon, France, they expect to determine neutrino mass hierarchy with at least 3-sigma significance after three years of operation. Read the press release in full.

EVENTS & MEETINGS:

- **APPEC TOWN MEETING 2016**
  6-7 April, Paris, France.
- **Interdisciplinary Meeting on 'Contested Astrophysics'**
  12-14 April, Dublin, Ireland.
- **12th Patras Workshop on Axions, WIMPs and WISPs**
  20-24 June, Jeju Island, South Korea. Note: deadline for abstract submission is 4 April 2016.

To add your news or event to the newsletter, please contact Ruth McAvinia, APPEC Communications and Outreach Coordinator.

RECENTLY IN THE NEWS:

- **The most energetic light ever observed from a few kilometres large star**
  MAGIC press release regarding teraelectronvolt pulsed emission from the Crab Pulsar
- **Water tank filling at Xenon1T**
  Latest blog post from the Xenon1T team
- **ANTARES follow-up of Gravitational Wave event GW150914**
  The first high-energy neutrino follow-up of a significant gravitational wave detections using the data recorded by the ANTARES and IceCube neutrino telescopes - see also announcement from IceCube