



Contribution ID: 792

**The Astroparticle Physics Conference** 34<sup>th</sup> International Cosmic Ray Conference July 30 - August 6, 2015 The Hague, The Netherlands

Type: Oral contribution

## Giant Shocks in the Fermi Bubbles and the Origin of the Microwave Haze

Tuesday 4 August 2015 11:15 (15 minutes)

Analysis of  $\gamma$ -ray data provided by the Fermi-LAT has revealed giant, hard-spectrum  $\gamma$ -ray lobes emanating from the Galactic nucleus (and extending to  $|b| \sim 50^\circ$ ). These Fermi Bubbles' have hard-spectrum, total-intensity microwave (~20-40 GHz) counterparts in their lower reaches (the microwaveHaze' extending to  $|b| \sim 35^\circ$ ) and, on large scales, are subsumed by steep spectrum, polarised radio (2-20 GHz) structures (the 'S-PASS Lobes' extending to  $|b| \sim 60^\circ$ ). We present a unified model for these disparate, non-thermal phenomena in which the Bubbles are inflated by a wind driven by star formation in the central molecular zone of the Galactic Center. Giant reverse shocks located ~1 kpc above and below the nucleus in the interior of the Bubbles accelerate relativistic electrons, accounting for the microwave haze associated with them. The  $\gamma$ -rays are produced by hadronic emission through shock accelerated relativistic protons interacting with dense, thermally unstable clouds within the Bubbles but concentrated near their edges. The Bubbles are currently slowly expanding, with ages of a few x 100 Myr. Lower energy, non-thermal electrons accelerated at the shocks reach the edges of the Bubbles and escape from their upper regions accounting for the steep spectrum, polarized radio emission covering the Bubbles and pluming out beyond them at high Galactic latitudes.

## Collaboration

- not specified -

## Registration number following "ICRC2015-I/"

692

Author: CROCKER, Roland (Australian National University)

**Co-authors:** Dr TAYLOR, Andrew (Dublin Institute for Advanced Studies); Dr CARRETTI, Ettore (Cagliari Observatory (INAF)); Prof. BICKNELL, Geoffrey (Australian National University)

Presenter: CROCKER, Roland (Australian National University)

Session Classification: Parallel GA14 GAL / Bubbles etc

Track Classification: GA-TH