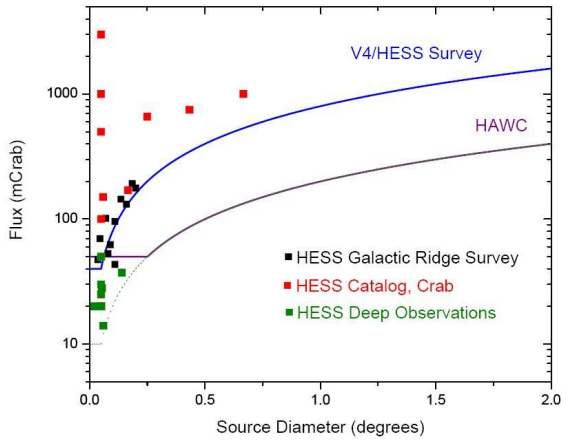

Fig. 5. Comparison of γ-ray sensitivity between the IACT and HAWC 2 year sky surveys as a function of the source angular diameter. The HESS detected Galactic sources are shown as well as the Milagro source in the Cygnus region.

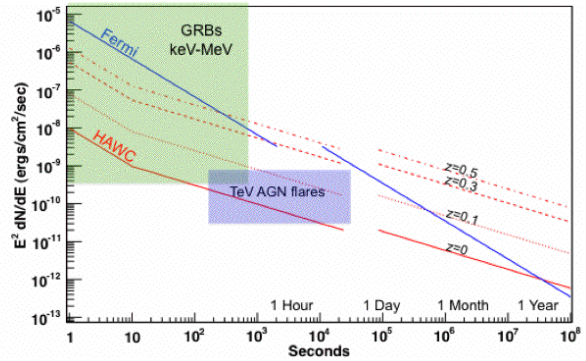

Fig. 6. HAWC sensitivity (red) to extragalactic transients at different redshifts for a 5σ detection threshold. The y-axis is k where dN/dE= k $E^{-2}\exp^{-\tau(z,E)}$ and τ(z,E) is the optical depth due to absorption by the extragalactic background light from the model of Gilmore (2009). Also, shown is the flux necessary for a Fermi detection of 5 gamma rays above 10 GeV.

cal sources in order to search for new fundamental physics effects. Examples of possible HAWC investigations include: (1) Constraining the existence of nearby dark matter. HAWC will detect Geminga at nearly 100σ resolving its spatial structure on parsec scales to better understand pulsar wind nebulae and determining Gemingas contribution to the electron, positron, and hadronic flux at Earth. HAWC will also better characterize the spectrum, flux, and variability of the cosmic ray anisotropy to better understand cosmic ray propagation. (2) Measuring the attenuation of astrophysical sources due to interactions with the EBL. HAWC will enable multiple sources to be observed in various flaring states to understand the intrinsic TeV spectrum. Current constraints on the EBL make a conservative assumption of a very hard intrinsic spectrum and are very close to the maximum allowed from galaxy counts. These observations have led to postulations of the existence of axions (Hopper & Serpico 2007) in order to reduce the attenuation of TeV emission from EBL.

The construction of HAWC has been planned in four consecutive stages of 7, 30, 100 and 300 tanks compleating construction in 2014. The first construction stage of HAWC, with 7 tanks, has officially started, see Figure 7.

HAWC is an all-sky telescope with duty cycle ∼95% with sufficient sensitivity to discover new sources and to monitor the sky and known sources for transient emission. It also can help with the understanding of the astrophysical background in order to determine if deviations from this background could be due to new physics.

Fig. 7. Picture shows the construction status of HAWC.

The HAWC project has been supported by the National Science Foundation (grant number PHY-0820875), the US Department of Energy Office of High-Energy Physics, Los Alamos National Laboratory LDRD, CONACYT (grant numbers 122331, 105666 and 105033), Red de Altas Energías, CONACYT, DGAPA-UNAM (gran number IN112910) and UNAM internal funds.

REFERENCES

Abdo, A. A., et al. 2007a, ApJ, 664, L91
Adbo, A. A., et al. 2007b, ApJ, 658, L33
Atkins, R., et al. 2005, PhRvL, 95, 251103
Hooper, D., & Serpico, P. D. 2007, PhRvL, 99, 231102
Goodman, J., et al. 2007, Proc. 30th International Cosmic Ray Conference, ed. R. Caballero et al., 1221