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**High Energy Cosmic Ray Air Shower Events Studied through Radio Emission** MICHAEL DEATON, Abilene Christian University — One of the great mysteries remaining in astrophysics today is the unknown production mechanism of high-energy cosmic rays (HECRs). Since their initial discovery in the early 20th century, much greater energy cosmic ray events have been documented, some exceeding  $10^{20}$  eV. In 1962 G. A. Askaryan proposed that air showers of elementary particles produced by HECRs entering the atmosphere would emit a coherent radio signature (*Sov. Phys. JETP* **14**, 441–443). The electronics available at the time, however, were largely incapable of handling such signals. Innovative research in this field is only recently possible with the advent of a new species of interferometric software radio telescopes. Within this category, the LOPES phased array (Low Frequency Array Prototype Station), operating within the range of 40–80 MHz, seeks to further study the processes of high energy cosmic ray air showers. The LOPES collaboration has recently reported a breakthrough correlation between HECR air shower events and predicted radio flashes as explained by so-called geosynchrotron radiation (Falcke, H. et al. *Nature* **435**, 313–316, 2005). This presentation will briefly describe the LOPES project and the software development that was completed for LOPES-Tools, the software package that is used for data analysis and mitigation of radio frequency interference for the LOPES project.

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