

We present a concept for on-orbit radio detection of ultra-high energy cosmic rays (UHECRs) that has the potential to provide collection rates of ~ 100 events per year for energies above 10^{20} eV. The synoptic wideband orbiting radio detector (SWORD) mission's high event statistics at these energies combined with the pointing capabilities of a space-borne antenna array could enable charged particle astronomy. The detector concept is based on ANITA's successful detection UHECRs where the geosynchrotron radio signal produced by the extended air shower is reflected off the Earth's surface and detected in flight.