7) Experiment Description:

The University of New Mexico's Measurement Astrophysics Group operates the Astronomical LIDAR for Extinction (ALE), a green-light eye-safe lidar system, to monitor the transparency of the atmosphere supporting ground-based telescope observations. Because this lidar system propagates a laser in controlled airspace, the FAA requires that we have human spotters to make sure we do not illuminate aircraft operating in Albuquerque airspace. Illumination with our laser does not pose any direct threat to aviation, but could be a distraction to pilots. This is becoming a more common issue with astronomical observatories nationwide as the utility of probing the atmosphere with lasers in support of observations has become routine. The use of human spotters though has its own set of problems, including the cost of employment of spotters, but more critically that human spotters are far from 100% reliable, especially in cold, dark observatory environments.

Because of these issues, we are seeking to, at first, augment our human spotters with radar, in particular using a small recreational marine radar, that will actively detect aircraft in our operating area. Ultimately we hope to prove to the FAA that such a system is better than human spotters.

The system we have in mind is a commercially available broadband marine radar (100mW @ 9.3-9.4GHz) that is nominally licensed for recreational boating (e.g. http://www.simrad-yachting.com/Products/Broadband-Radar/Broadband-Radar/). Marine radars are cheap, reliable and now with the new 'broadband' cw radars such as the one linked above, which have very low power emissions, seem like a very attractive option for active detection of aircraft without interfering with other operations in an observatory environment. The system itself will require a small modification to aim the transmitter/receiver up from its normal horizontal sweep to one that sweeps a cone above the horizon and covers the perimeter of our operations area. It also thus will not directly interfere with other terrestrial equipment.