

## ABSTRACT

In this thesis, the use of the Jamaican Mark II laser radar system to detect the Raman backscatter from atmospheric Nitrogen is described. An outline of previous lidar work done is given and relevant theory is examined. The general and special features of the equipment, including the ancillary counting system, are described as well as the experimental technique adopted to overcome particular difficulties.

Measurements were made on several occasions during December, 1972 and July and August, 1973. Return signal significantly in excess of noise was detected up to a height of about 45 km. This signal returning from stratospheric heights above 16 km was in general agreement with local balloon borne radiosonde measurements of atmospheric density made at approximately the same time and place. And, in addition the results compared favourably with mean annual density values obtained from the United States Standard Atmosphere for 15° North.

The results of the investigation show that the powerful Mark II system transmitting at the ruby wavelength  $6943 \text{ \AA}$ , with the returning radiation at  $8284 \text{ \AA}$ , can extend the range of detection

of Raman backscatter from Nitrogen to stratospheric heights well above those heights from which backscatter had been previously reported.