Standoff Detection of Nuclear Materials

A similar (remote) LIDAR technique to detect the presence of the nuclear materials by measuring the local concentration of N2 ionized molecules

Inventors at Georgia Tech have used a similar (remote) LIDAR technique to detect the presence of the nuclear materials by measuring the local concentration of N_2 ionized molecules. A laser strobe (short pulses of specific wavelength) is aimed at the volume surrounding the potential radioactive source near the ground level, causing the excited/ionized nitrogen molecules to fluoresce. A receiver, (telescope co-located with the laser) subsequently collects the fluorescence photons, further converting it into an electrical signal by a photodetector. A narrowband optical filter reduces the background noise from solar and artificial illumination.

The intensity of the received signal is then translated into the concentration of excited/ionized N_2, and, ultimately, into the measure of the nuclear material radiation/presence. The technology enables radioactive materials detection by measuring (escaping) ionized air by using either direct detection or standoff LIDAR.

Summary Bullets

- Air-ionization measurement, molecular resonance, excitation and fluorescence
- Remote (LIDAR) probing/detection of inaccessible (or hidden) radiation sources
- On-site (Direct) ionization detection/monitoring (Ionized air pump) of radiation materials

Solution Advantages

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Potential Commercial Applications

The method could become an effective technique for: nuclear facility monitoring, radioactive WoMD detection, Port Authority/ DTRA monitoring, and both urban and field military applications.

Background and More Information

Nitrogen (N_2) comprises approximately 78% of the atmosphere at ground level, substantially contributing to excited or ionized [N_2^+] molecules produced by radiation from nuclear materials. At the same time, there is a possibility of measuring the density of excited or ionized nitrogen remotely. Thus, the aurora events in Earth's ionosphere have been investigated before by using light detection and ranging (LIDAR) techniques.

Inventors

- Brent Wagner
  Principal Research Scientist - Georgia Tech Research Institute

IP Status

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Publications

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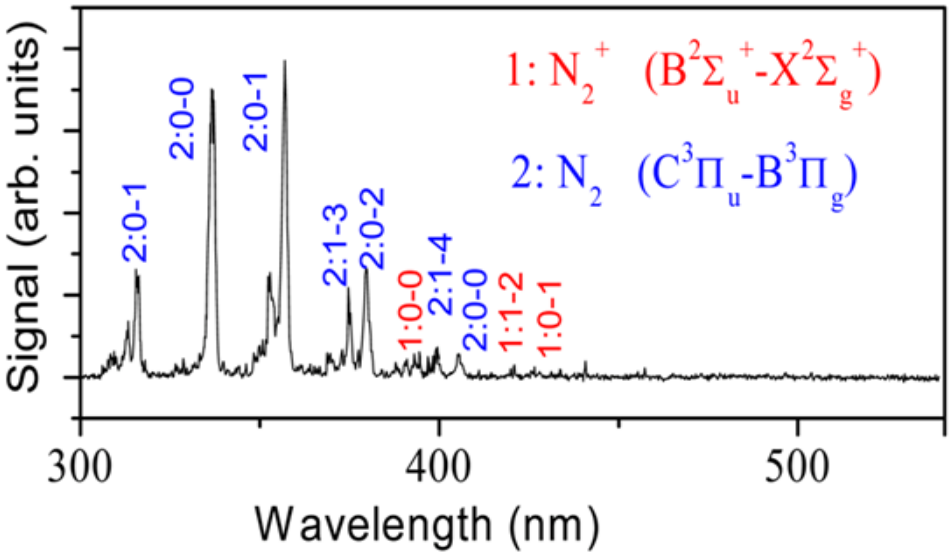
Images



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