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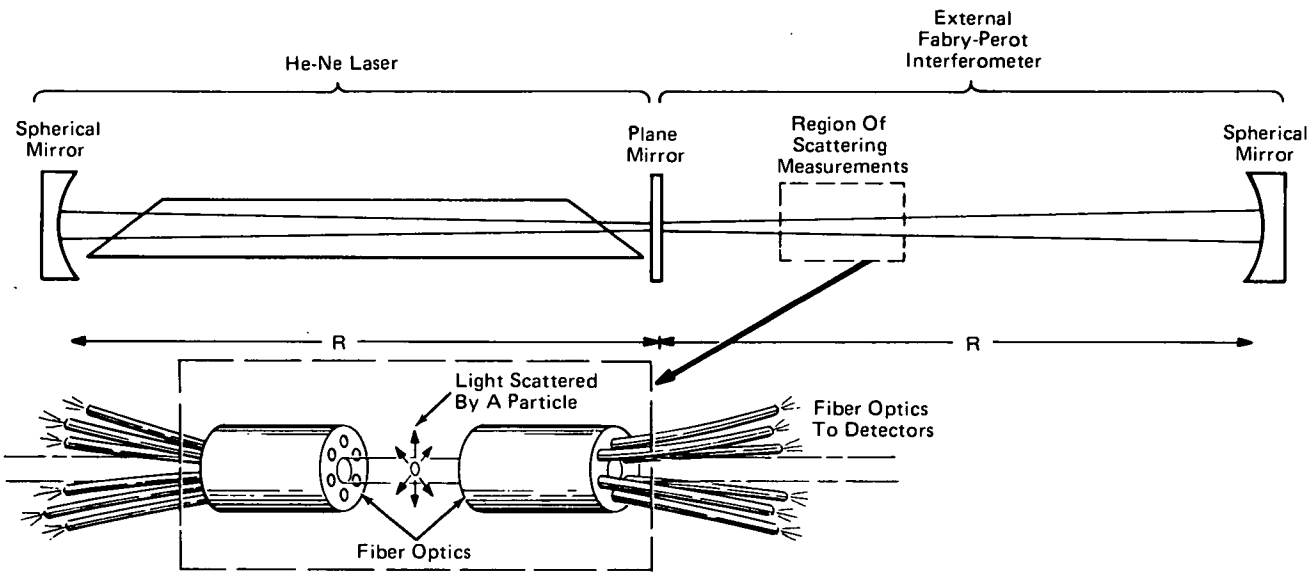
NASA TECH BRIEF

NASA Headquarters

Particle Detection With Intensified Laser Beam



The problem:

The accuracy of an instrument that measures light scattered by dispersed particles is limited by intensity of the incident light. This limitation exists in nephelometry (measurement of light scattered by particles which are dispersed in a medium) and in single particle detection. Thus, to improve accuracy, incident light intensities must be increased.

The solution:

Light intensities may be substantially increased by use of a laser-fed Fabry-Perot interferometer.

How it's done:

An external and the laser output mirrors serve as the interferometer, as shown in the figure. Because the external mirror is 99.9% reflective, the interferometer forms an oscillating beam of high efficiency. Measurements in this arrangement indicate a 50-to-100-fold increase in output intensity. Further improvements are possible with optimal mirror arrangements and the use of low-loss coating outside the laser output mirror.

Because the light is incident on the particles from both directions, an additional advantage of this technique is that the scattering function is a combination of forward and backward scattering over many different angles. Thus, the oscillating nature of the scattering function is smoothed. Forward scattered light, which is the highest scattering component, may be collected at small angles in either the reverse or forward direction. This light is collected by the fiber optics bundle which is connected to the detectors.

(continued overleaf)

Note:

Requests for further information may be directed to:
Technology Utilization Officer
NASA Headquarters
Code KT
Washington, D.C. 20546
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Patent status:

No patent action is contemplated by NASA.

Source: R. G. Knollenberg of
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No further information
available per letter from
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