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Raman LIDARs for the Cherenkov Telescope Array Observatory

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The Cherenkov Telescope Array (CTA) is the next generation of Imaging Atmospheric Cherenkov Telescopes (IACTs). It would reach a sensitivity and an energy resolution never seen before in very high energy gamma-ray astronomy. In order to achieve this goal, the systematic uncertainties derived from the atmospheric conditions shall be reduced to the minimum. Different instruments may help to account for these uncertainties. In this case, the Barcelona IFAE and UAB groups, and the LUPM in Montpellier are building Raman LIDARs, devices which can reduce the systematic uncertainties in the reconstruction of the gamma-ray energies from a 20% down to less than 5%. The Raman LIDARs subject of this work, are coaxial 1.8 m mirrors and Nd-YAG lasers. A liquid light-guide collects the light at the focal plane and transports it to the readout system. A monochromator, a device composed of a system of filters and a single photomultiplier centered on one elastic channel, is being developed with the purpose of testing the readout chain of the LIDAR. After characterizing the system, a polychromator will be built in order to also collect the sparse Raman signal, which needs to be optimized to reduce every possible loss of signal.

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