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SNDice: a Calibration System designed for Wide Field Imagers

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Dark Energy studies with type Ia supernovae set very tight constraints on the photometric calibration of the imagers used to detect the supernovae and follow them up. Among the key challenges is the measurement of the shape and normalization of the instrumental throughput. In particular, it is absolutely vital to control the flux intercalibration of the imager passbands.

The DICE system was developed by members of the Supernova Legacy Survey (SNLS) collaboration, building upon the lessons learnt working with the MegaCam imager. It consists in a very stable light source, placed in the telescope enclosure, and generating compact, conical beams, yielding an almost flat illumination of the imager focal plane. The calibration light is generated by narrow spectrum LEDs selected to cover the entire wavelength range of the imager. It is monitored in real time by control photodiodes.

In this talk, we present the SNDice concept and discuss the main points of the data analysis. Prior to installation, the apparatus was calibrated on a spectrophotometric test bench using a photodiode calibrated at NIST as a primary standard and taking into account any thermal drift of the system. We report on the stability of the light source and the accuracy of this calibration. The calibration frames taken with MegaCam encode a tremendous amount of information, on the focal plane and the telescope optics. In particular, they are polluted by ghosts generated within the telescope optics. We discuss techniques to separate, with a simple simulation, the direct light from the stray light, and constrain the imager passbands.

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