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Sommario/riassunto	Several novel diagnostic systems based on the detection of coherent THz radiation are presented. The investigation of the photon beam properties allow for bunch-by-bunch and turn-by-turn diagnostics of the emitting electron bunches in the accelerator. It is used for time-resolved studies of the micro-bunching instability. Accompanying simulations with Inovesa show a good agreement with the measurement which enhances the knowledge of the physics behind the micro-bunching instability.