Knowing the range of a proton beam is crucial for an accurate treatment because of the steep fall-off at the end of a Bragg curve. Proton beam range measurements are carried out as part of the daily quality assurance in proton therapy. Detectors currently available are either slow or expensive. We are developing a fast and cheap detector using a segmented plastic scintillator called "range telescope" (figure 1). A proton beam produces scintillation light when it deposits energy in the scintillator sheets. From the quenched light output we can reconstruct the proton beam range (figure 2).

A proof-of-principle beam test was performed in September 2017. The prototype is based on a CMOS sensor and three plastic scintillator sheets that are wrapped in reflective foil (figure 3). Figure 4 shows an image of the light output from which we can reconstruct the proton beam range.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 675265, OMA – Optimization of Medical Accelerators.