Properties of Single Crystal Para-Terphenyl as Medium for High Resolution TOF Detector

Among a large type of organic compound, para-terphenyl (C$_{18}$H$_{14}$) have proven to have practical applications as detector medium for particle physics.

In this poster the characterization of different sizes (1-3 cm) high quality mono-crystal p-terphenyl samples is presented. The optical and scintillation properties (emission spectrum, light yield, attenuation length, decay time) are investigated.

\[ \tau_1 = 2.1 \text{ ns (97%)} \]
\[ \tau_2 = 22.6 \text{ ns (3%)} \]

Attenuation length of 2.45 cm
Coupling a Silicon Photomultiplier-based readout system to the crystal, a small prototype for a high resolution TOF detector was built; the preliminary results, obtained on a 20x30x3 mm³ sample, with dual-side read-out (Hamamatsu S10931-050P SiPMs) and irradiated with $^{90}$Sr source, show a time resolution of $\sim$35ps.

![Graphs showing resolution and pulse amplitude over voltage for samples under test](image-url)