Microfluidic Scintillation Detector

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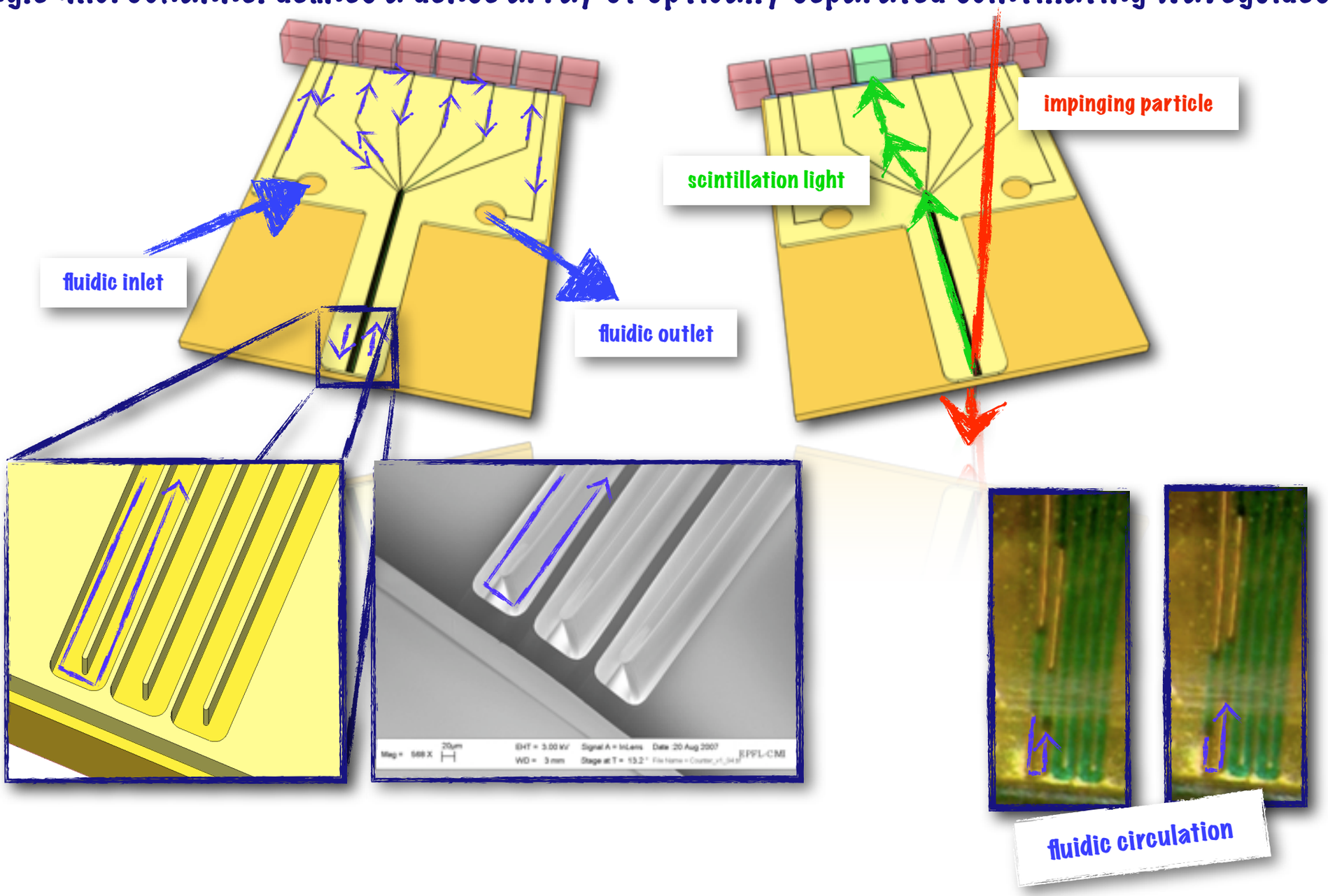
A single microchannel defines a dense array of optically separated scintillating waveguides.



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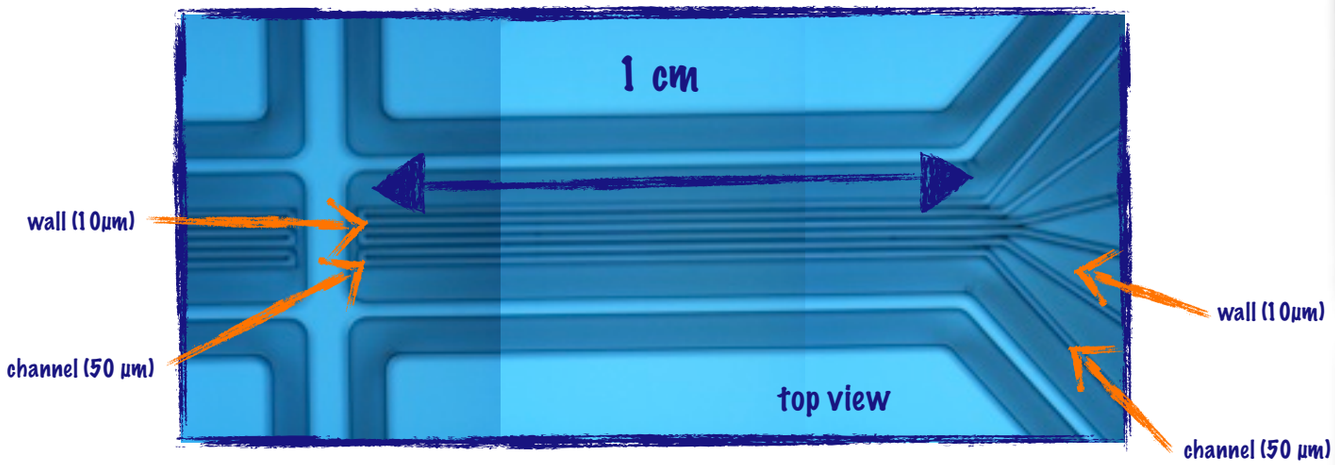
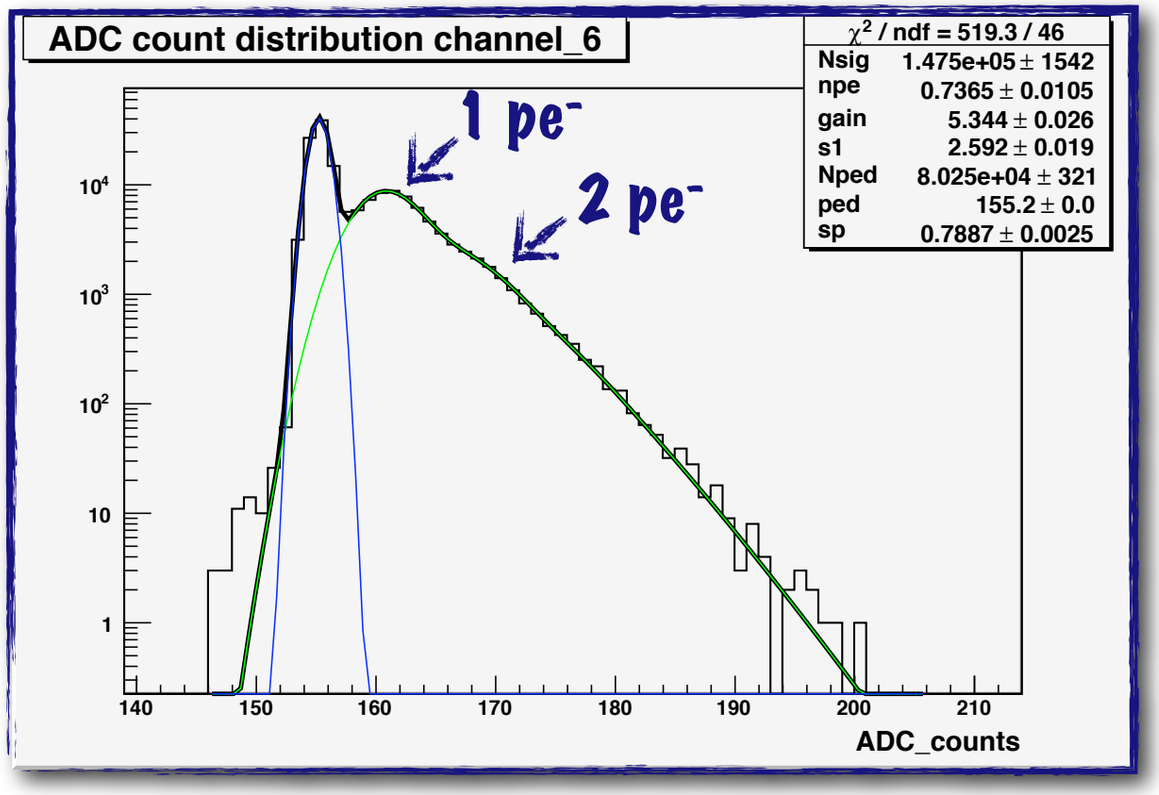
Experimental results

A microfluidic chip with channels of rectangular cross-section (50 µm x 200µm) separated by 10 µm thick walls was filled with the liquid scintillator EJ-305 with high light output (80% of Anthracene). It was exposed to electrons from a ^{90}Sr source considered as MIPs. The scintillation light produced by their interaction with the liquid was read-out by a photomultiplier tube (MAPMT H7546B by Hamamatsu). The photoelectric yield of this set-up was measured to be close to 1 photoelectron per MIP.





$$F(x) = \mathbf{N_{ped}} \cdot G(x, \mathbf{ped}, \mathbf{sp}) + \mathbf{N_{sig}} \sum_{n=1}^{\infty} P(n, \mathbf{n_{pe}}) \cdot G(x, \mathbf{gain} \cdot \mathbf{n} + \mathbf{ped}, \mathbf{s1} \cdot \sqrt{n})$$

pedestal — signal