Universidad Nacional de San Martín

CONICET ICIFI

Measurement of photon bunching using Silicon Photomultipliers

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Future Prospects of Intensity Interferometry
Permiter Institute
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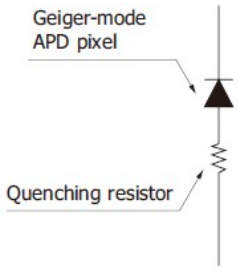
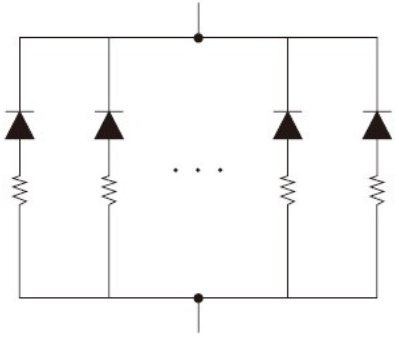
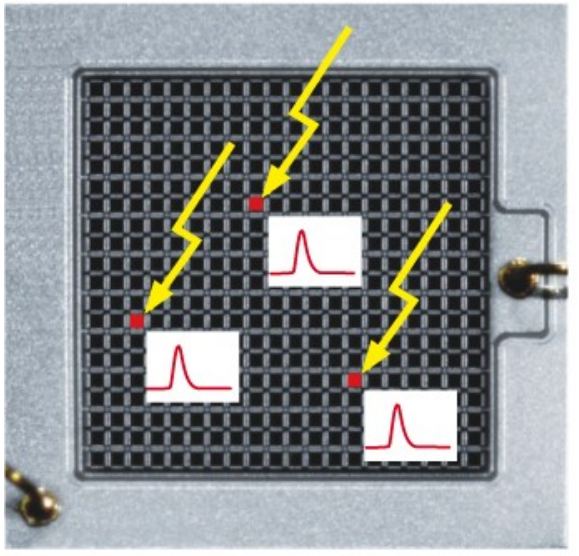
Silicon Photomultipliers (SiPM)

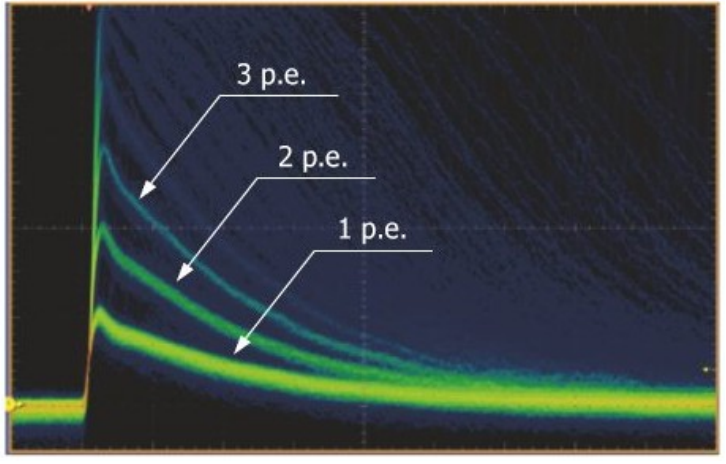
SPAD

SiPM (several SPADs in parallel)

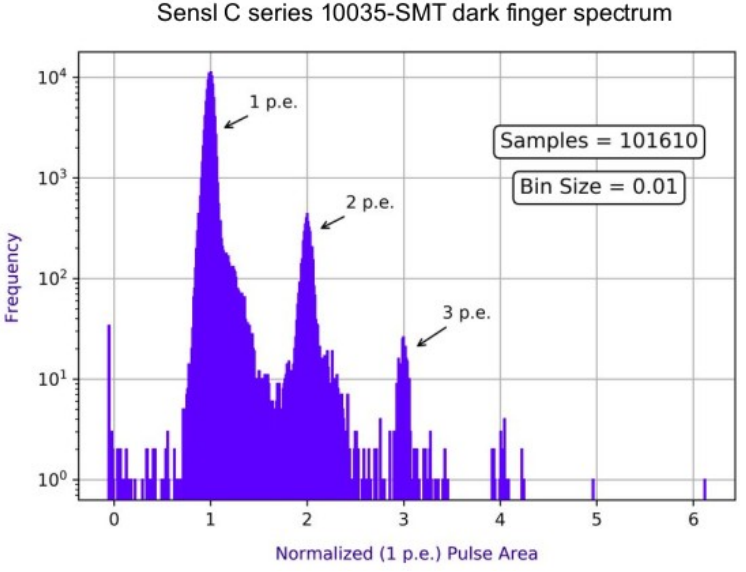




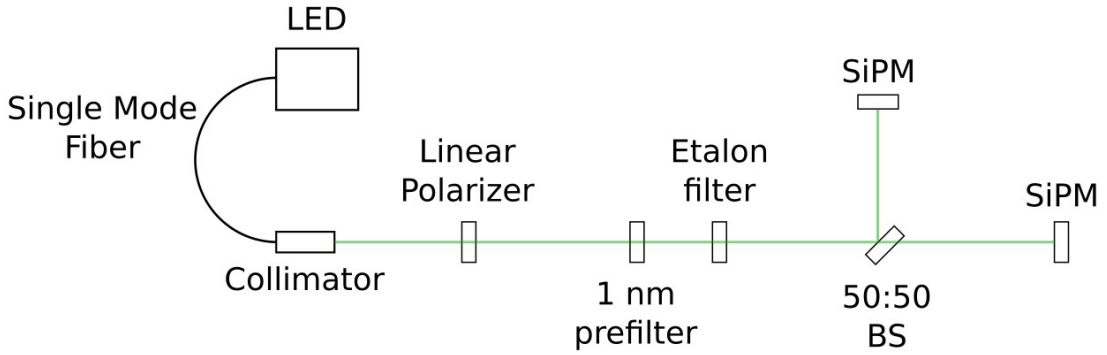


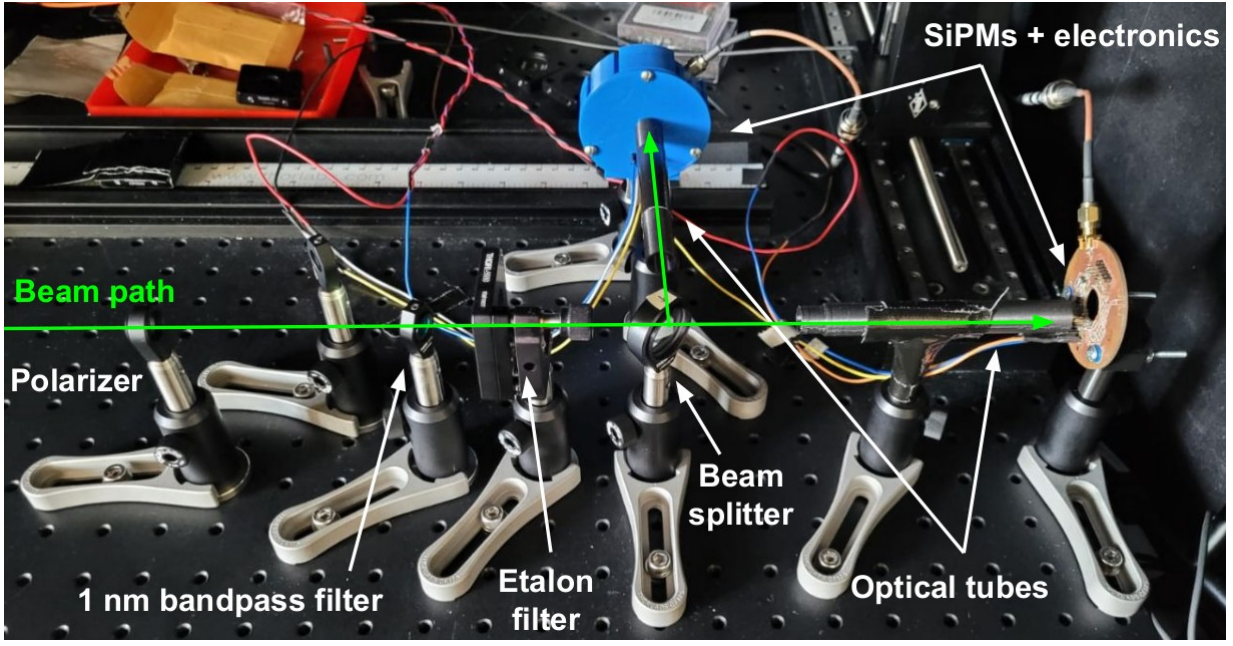


Hamamtsu.com

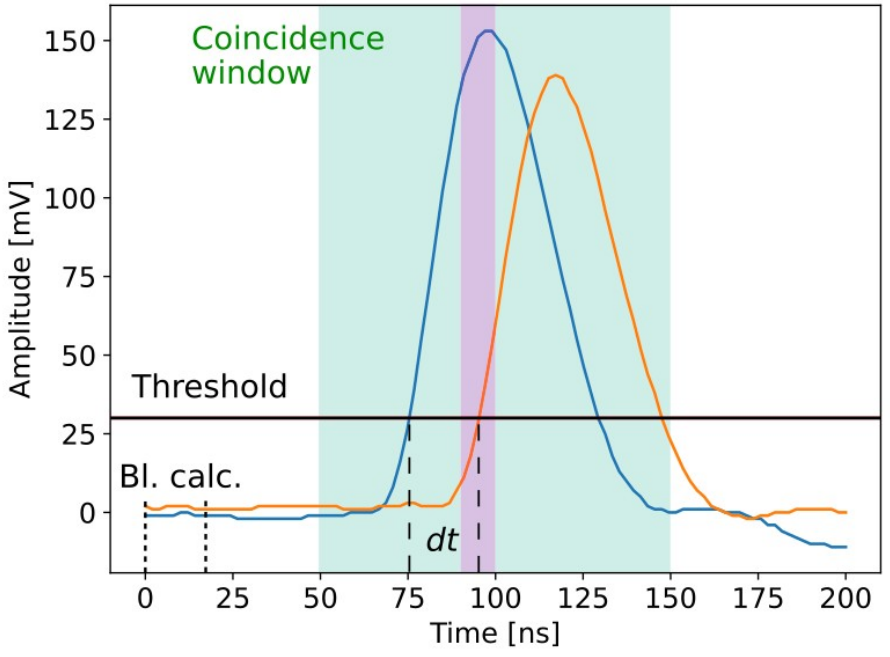


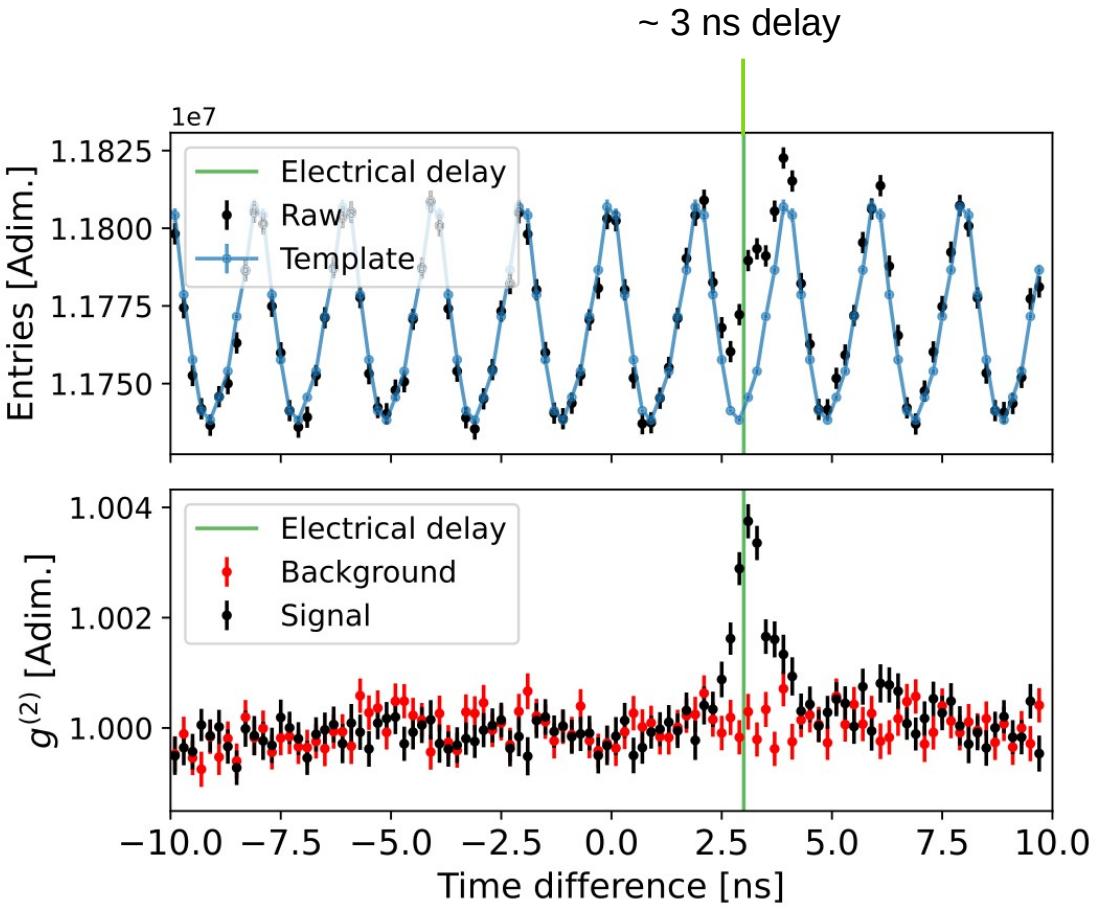
Bunching effect with SiPMs





Bunching effect with SiPMs



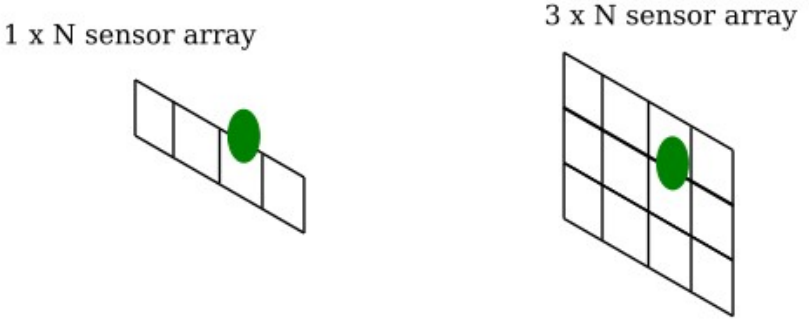


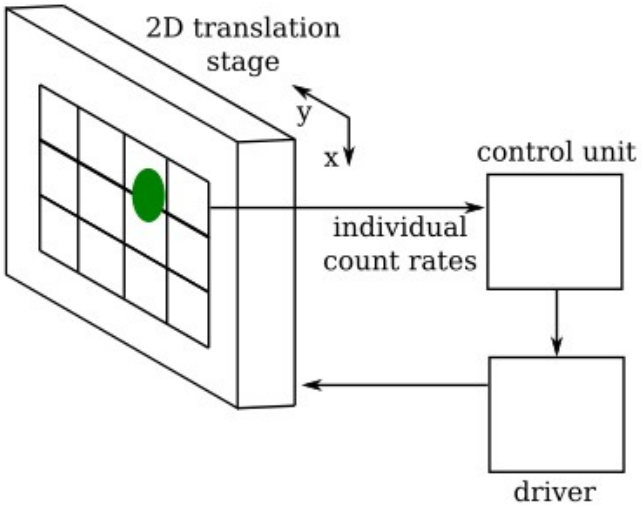
L. Finazzi et al., NIMA (2024)

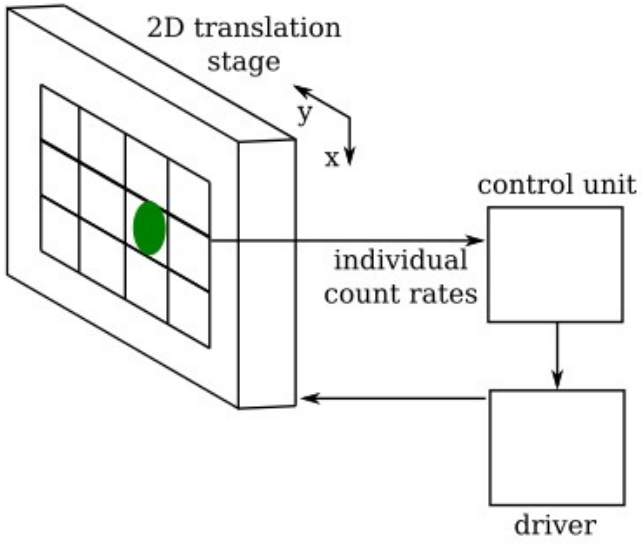
Thoughts on Future prospects of II

- Reaching faint and distant objects, Multi spectral Channel II.
- SNR scales with sqrt($N_{spectral}$)
- $N_{spectral}$ ~ 1000, SNR improve of ~ 30, Lim MagB improve of ~ 4
- Instrumenting ~ 1000 individual sensors, not trivial, but already demonstrated with SiPMs in the field.
- Medical imaging (PET, SPECT), Particle physics, etc.
- TRL (Technology Readiness Level)
    - From demonstration at the lab … to “on sky” operation.

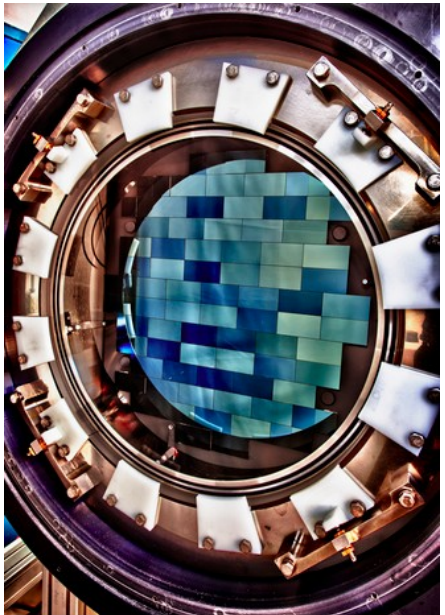
An instrument is a System. Example.





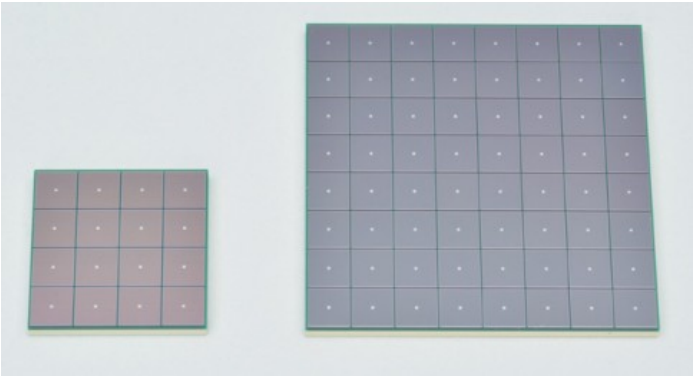


Scalability



Imager with all 74 chips, totaling 570 million pixels.

Dark Energy Camera
(www.darkenergysurvey.org)



SiPM arrays
(Hamamatsu, FBK. Onsemi, etc)

- Besides PDE and jitter: Pixel size, pixel pitch, ease of integration, robustness, etc.
- Not only in the sensor front, but also in the electronics.
- From lab prototype to the field.

Outlook

- I presented a measurement of photon bunching with SiPMs.
- I shared some thoughts about Future Prospects of II.