



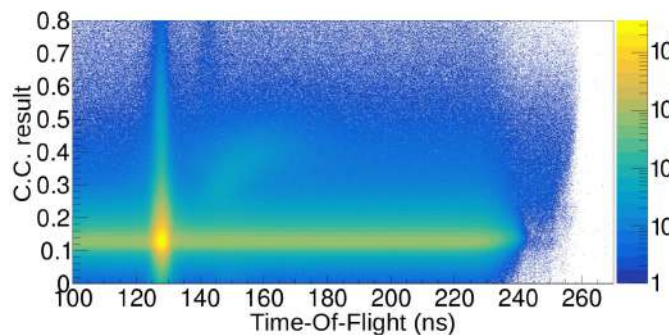
Implementation of a double trigger condition system based on Charge Comparison and TOF measurement for the NEDA detector array

Jose Manuel Deltoro

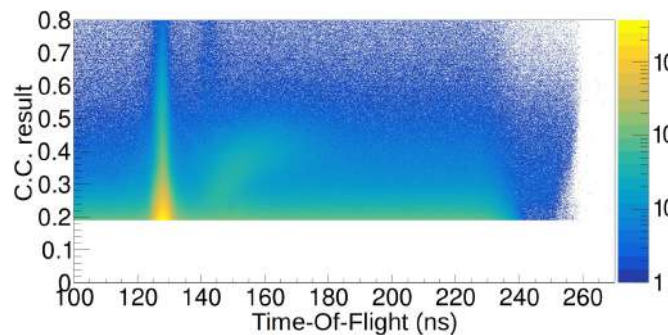
Department of Electronic Engineering, University of Valencia, Valencia, Spain

24th IEEE Real Time Conference – Quy Nhon, Vietnam

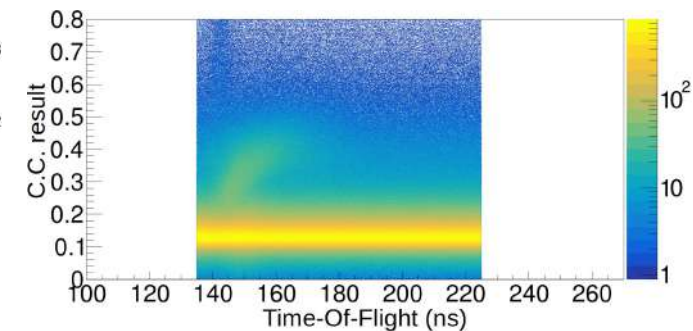
- The front-end electronics of NEDA (NEutron Detector Array) generate triggers based on **two trigger** methods: **Charge Comparison (C.C.)** and **Time-of-Flight (TOF)**.
- The Double Tigger condition system combines the trigger methods offering **4 different trigger modes**.



No trigger condition

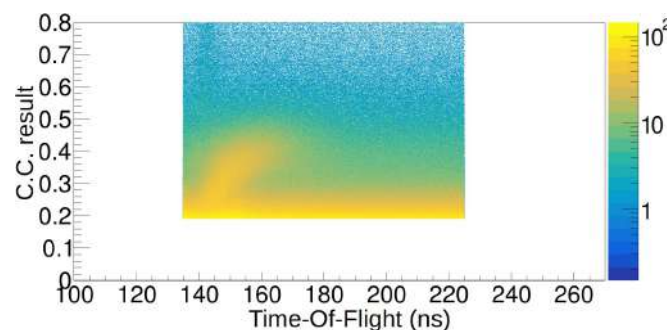


(a) C.C. mode

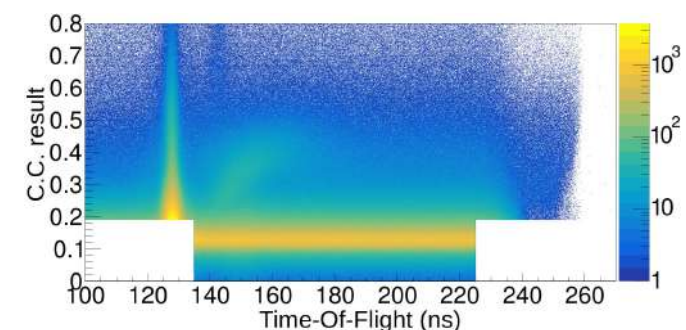


(b) TOF mode

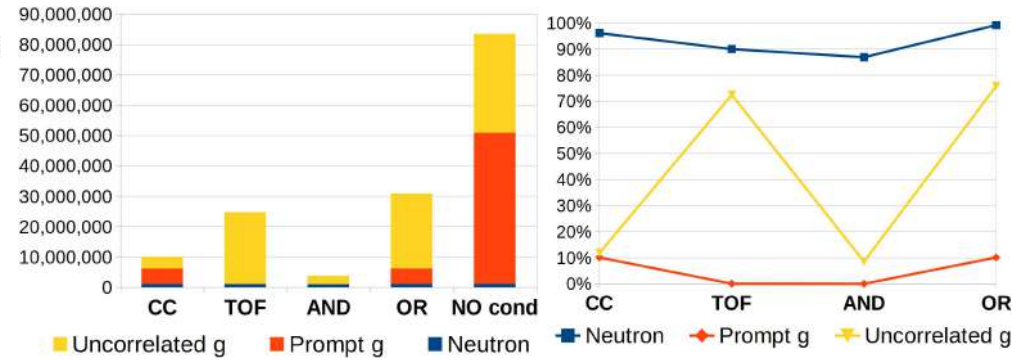
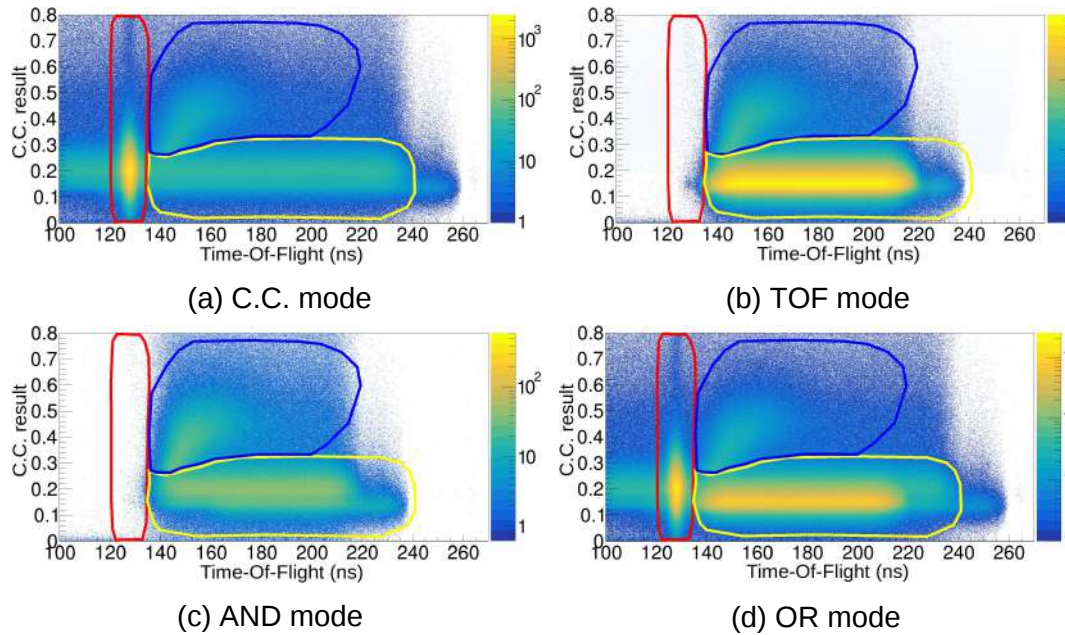
- C.C. mode:** **Only** the trigger generated by **Charge Comparison (CC)** is taken into account.
- TOF mode:** **Only** trigger based on **Time-of-Flight** is considered.
- AND mode:** A trigger signal is generated when **both** methods generate a trigger.
- OR mode:** A trigger signal is generated when **one of the two** trigger methods generates a trigger.



(c) AND mode



(d) OR mode

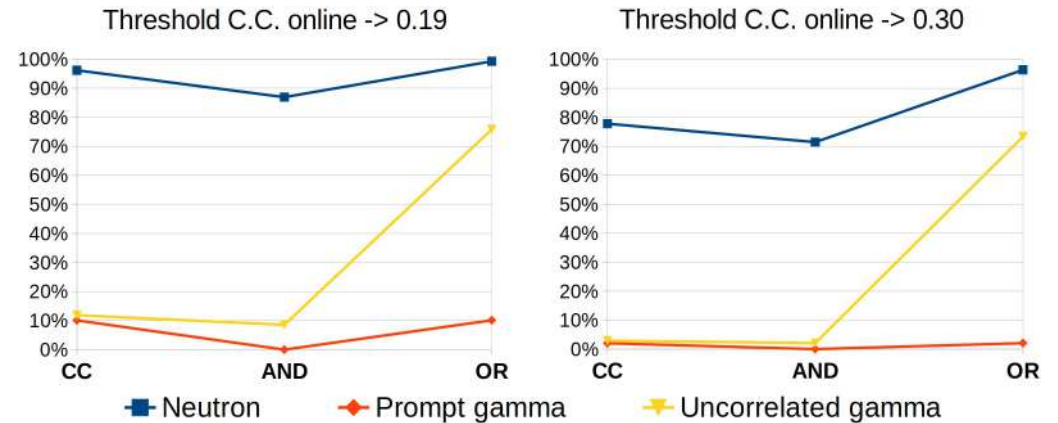


Number of events acquired in each trigger mode and for each type of particle.

Percentage by type of particle and by trigger mode compared to no trigger condition.

Distribution of events after a more precise offline analysis using the 4 trigger modes.

- **AND** trigger mode is useful if it is necessary to **reduce the counting rate**.
- **OR** mode is useful if we want to **detect low-energy neutrons** that would not be acquired with the other modes.
- With the **OR** mode it is **possible to modify the C.C. threshold without losing neutrons**.
- **The four discrimination modes have been tested** with different gamma and neutron sources and **used successfully in-beam experiments**.
- **Greater selection versatility is achieved** for the different experiments in which NEDA may participate.



Percentage of particles acquired compared to acquisition without trigger condition using different C.C. thresholds (0.19 and 0.30).



Thanks for your attention

Jose Manuel Deltoro

Department of Electronic Engineering, University of Valencia, Valencia, Spain

24th IEEE Real Time Conference – Quy Nhon, Vietnam



VNIVERSITAT
ID VALÈNCIA



Escola Tècnica Superior
d'Enginyeria **ETSE-UV**



Istituto Nazionale di Fisica Nucleare
LABORATORI NAZIONALI DI LEGNARO