Time Structure of ns Duration Bunches with Single Crystal Diamond Detector

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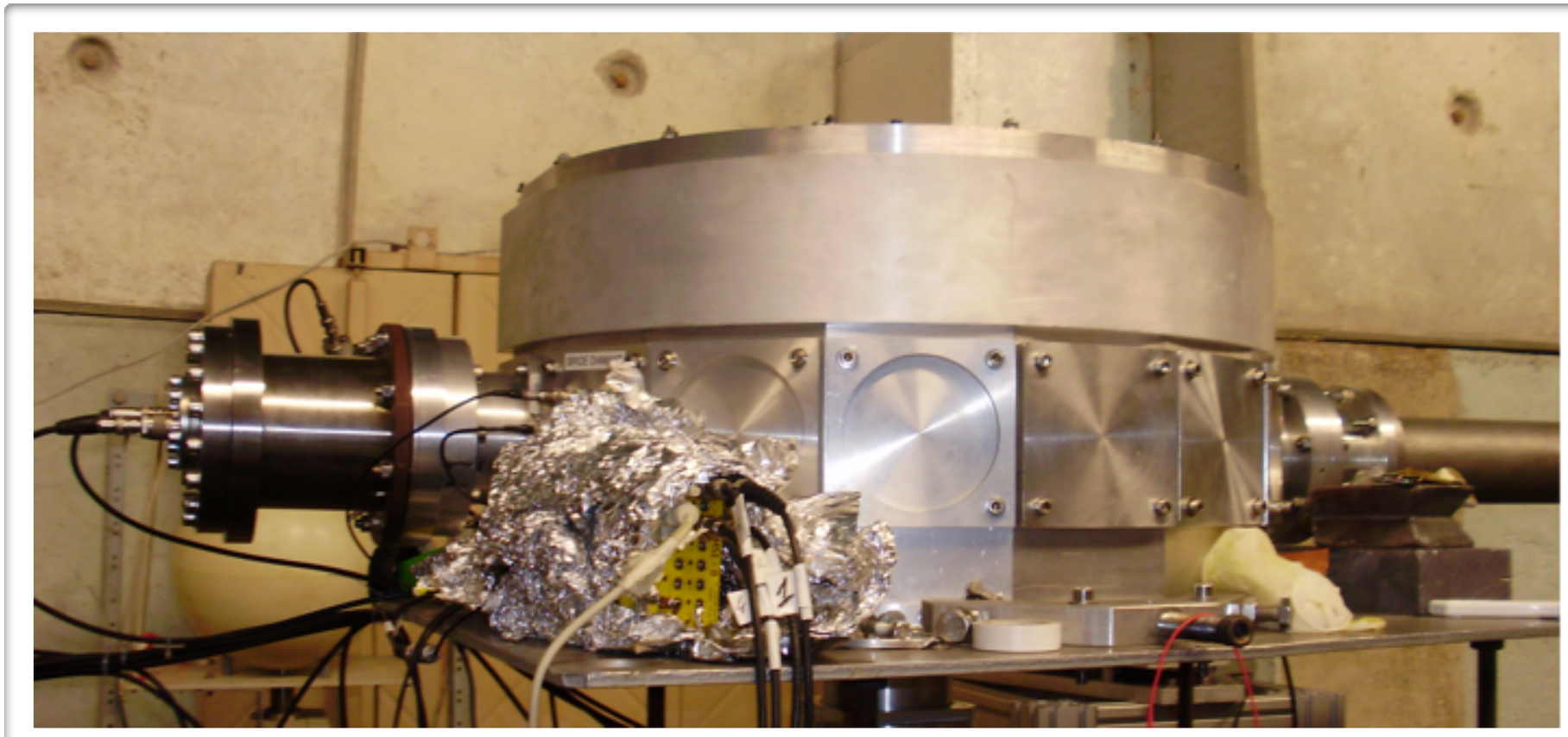
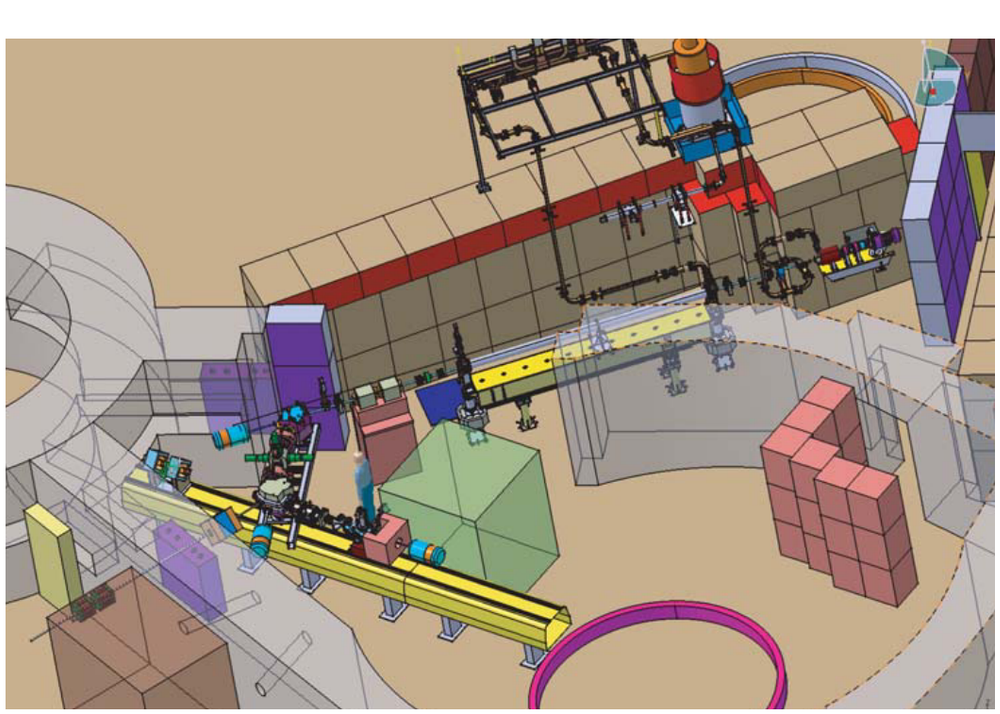


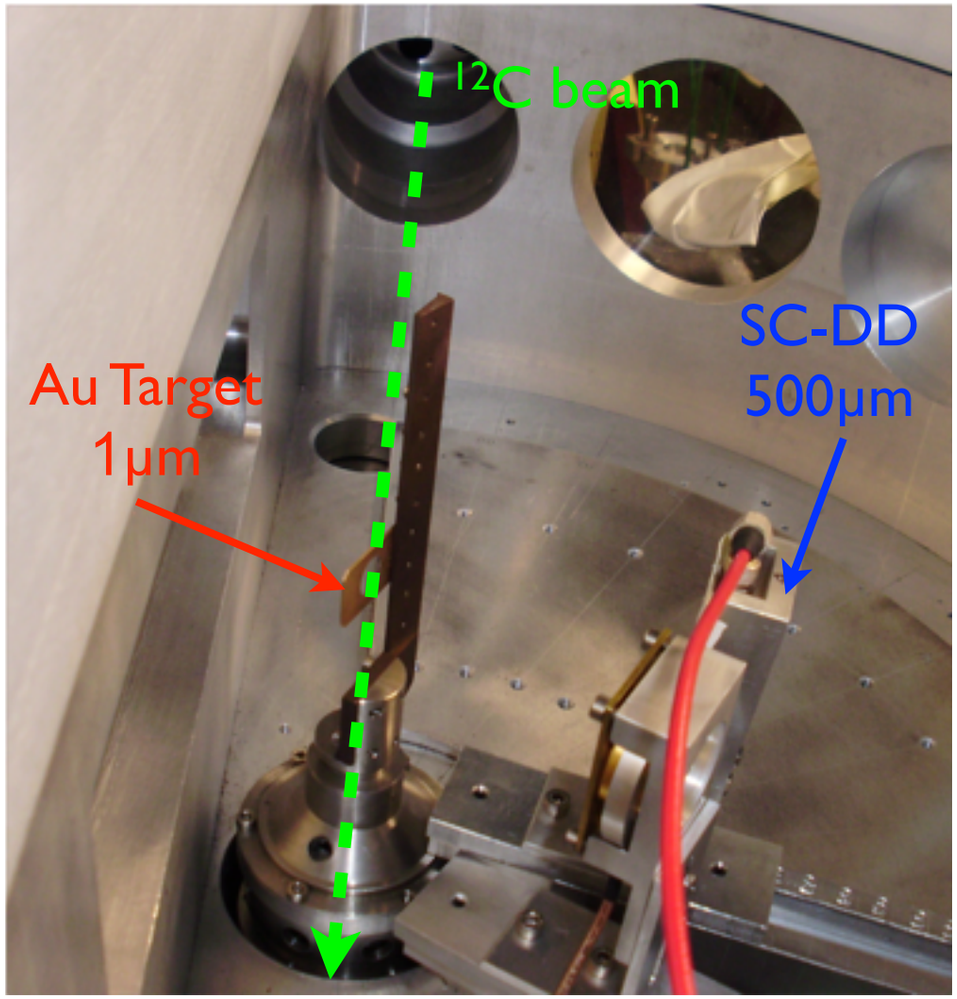
The aim ...

- Simple and effective diagnostic system.
- For energetic radioactive beam with very high intensities.
- Reconstruction of the bunches time structure .
- Also energy monitoring.
- SPIRAL 2 PP framework.

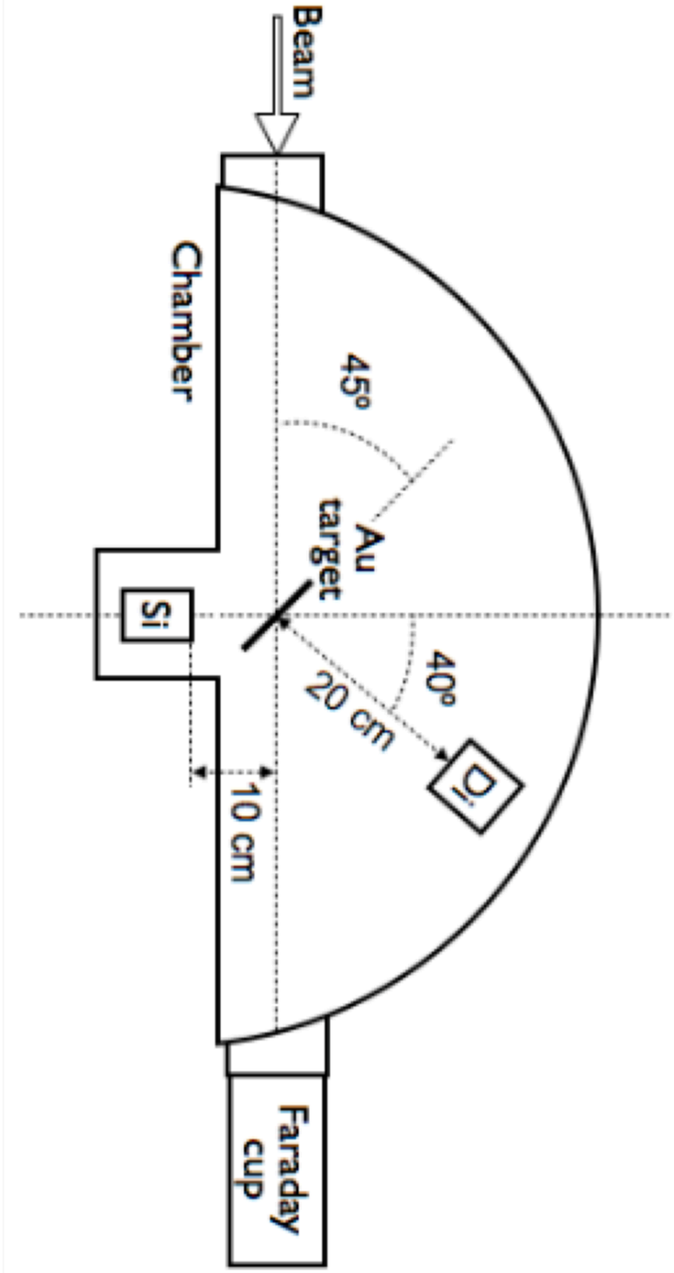


Tandem Alto IPN-Orsay

The setup ...

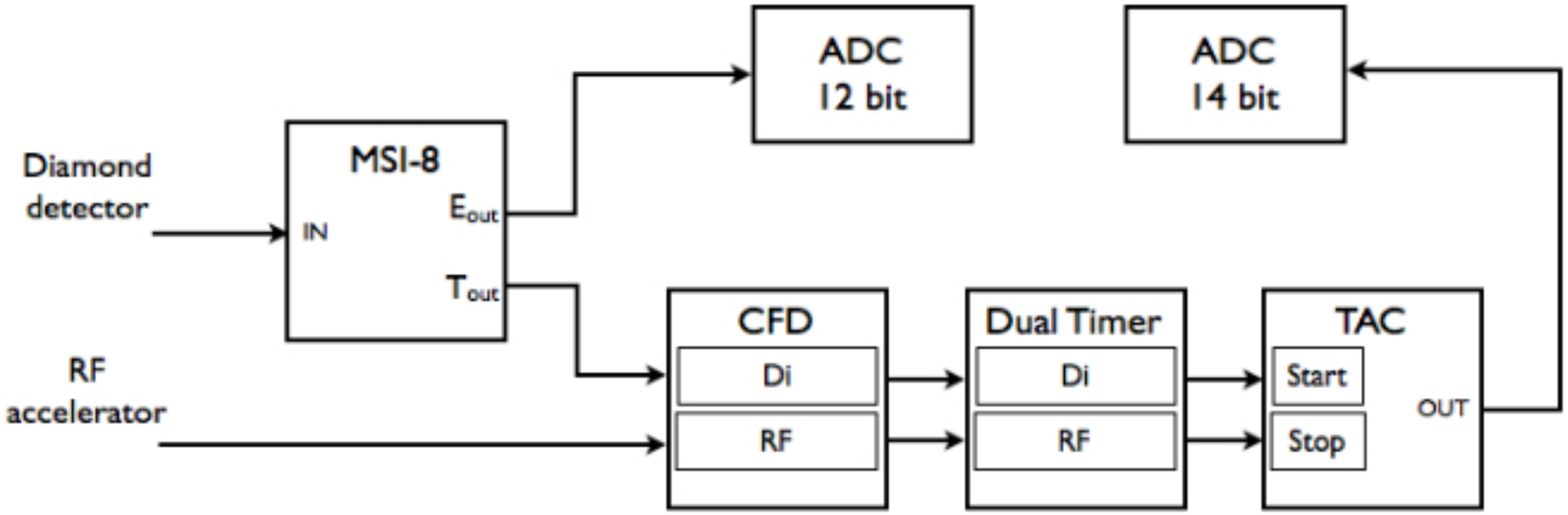


Interior of the reaction chamber



Setup schematic

The electronics ...



- Preamp+Shaper with energy & time outputs.
- Constant Fraction Discriminator avoid time walk.
- Time-to-Amplitude Converter, Δt=6 ps (FWHM).
- RF accelerator *2.5* MHz to stop the TAC.
- Limits dictated by the electronics.

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Advanced Diamond Detectors

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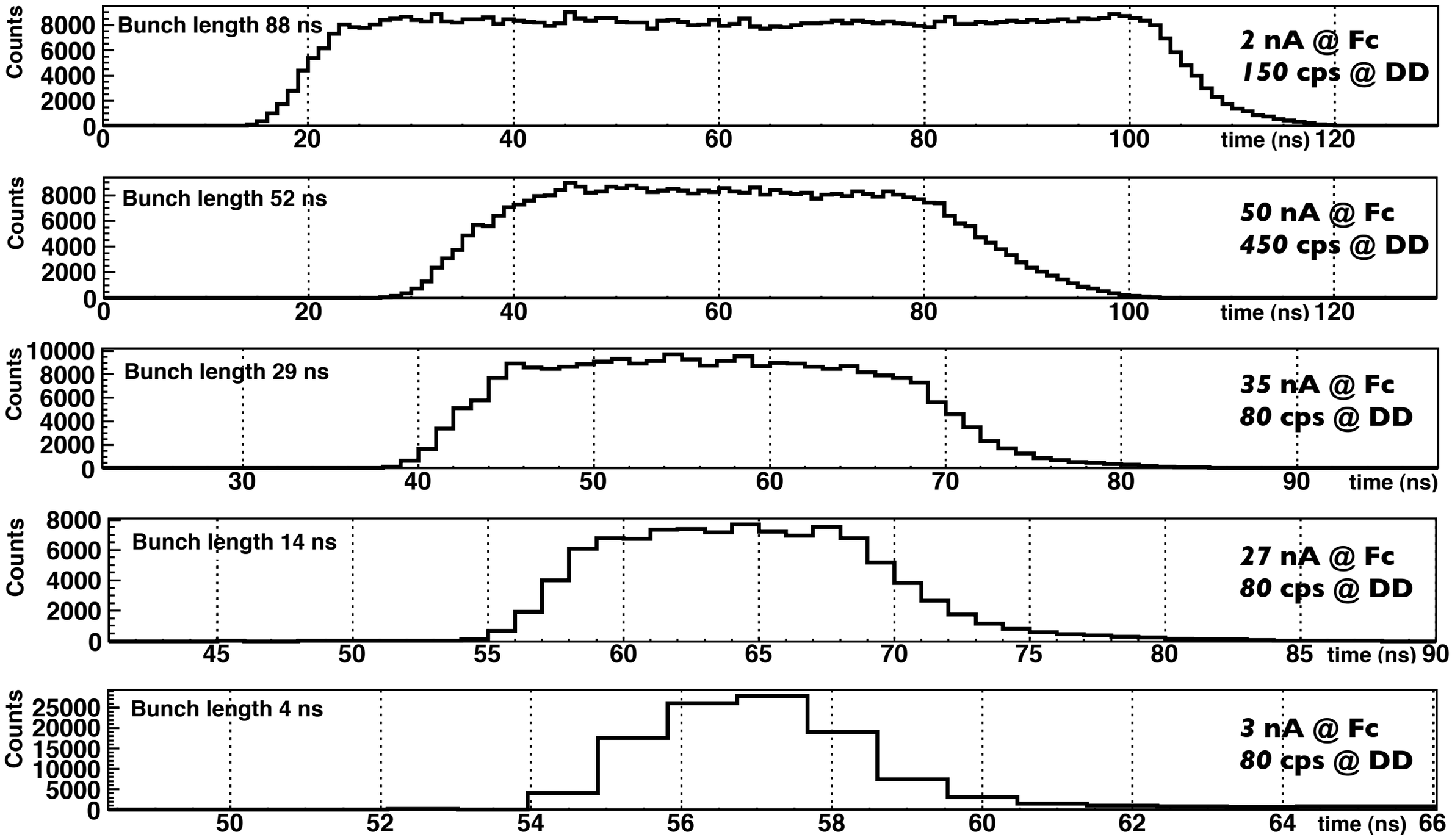
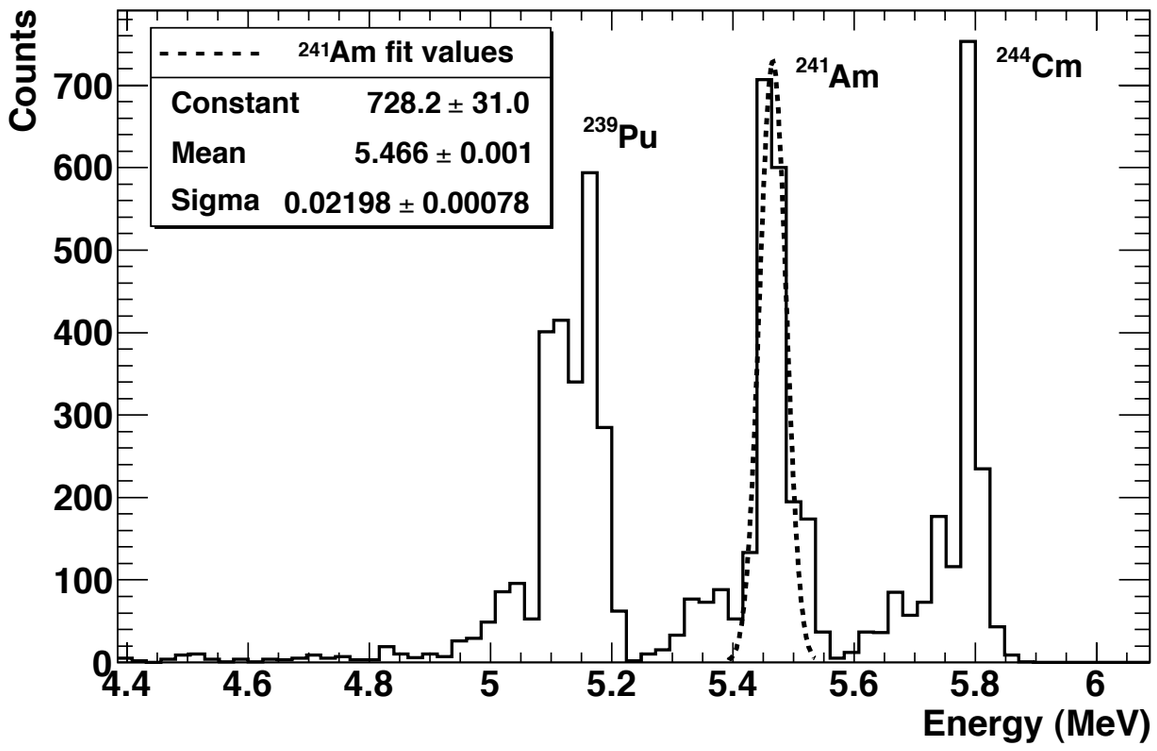
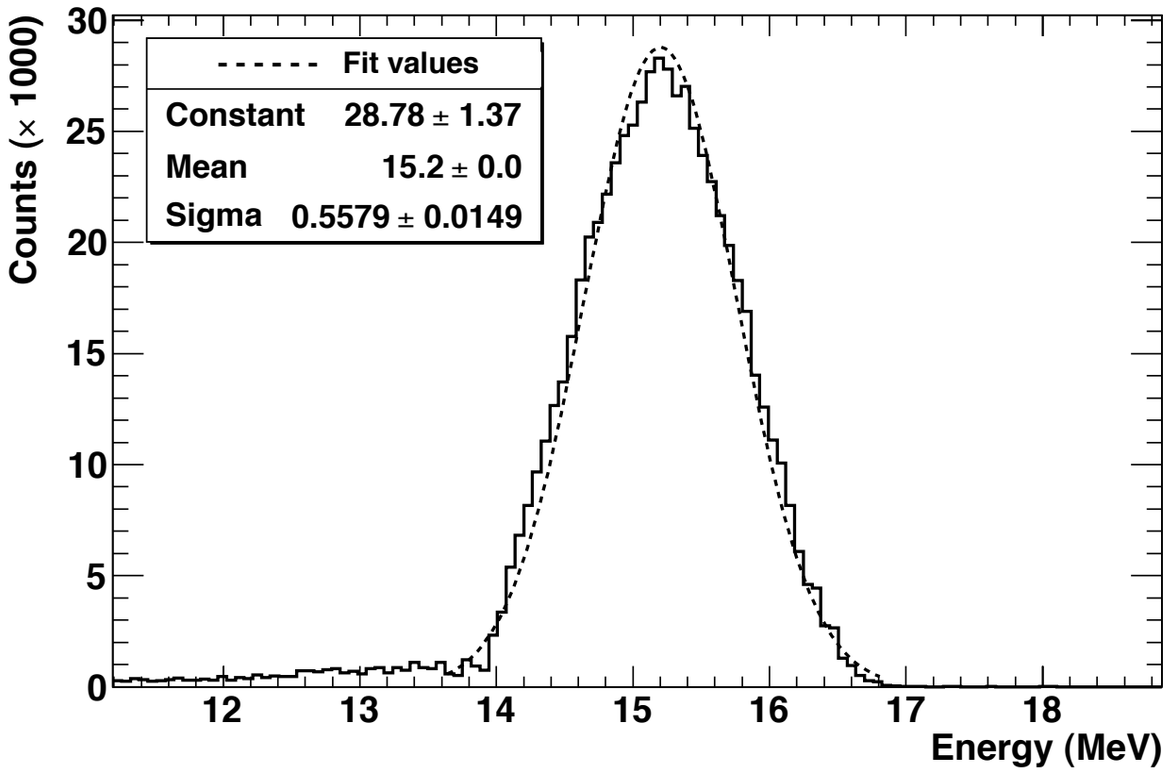
The bunches ... *20* MeV ^{12}C pulsed beam



The energy information ...



- In-situ DD calibration $\Delta E \approx 51$ keV.
- DD @ $+400$ V with $I_{max} < 2$ nA



- Beam energy spectrum simultaneously.
- Constant monitoring of the bunches.

The conclusions ...

- Time structure of *4* ns duration bunches has been achieved.
- SC-DD has shown very good both time & energy resolution.
- Commercially available electronics employed.
- The system could well be used for < 1ns bunches.
- This has established the bases for a more sophisticated and custom beam diagnostic system for SPIRAL2.