TUPB03

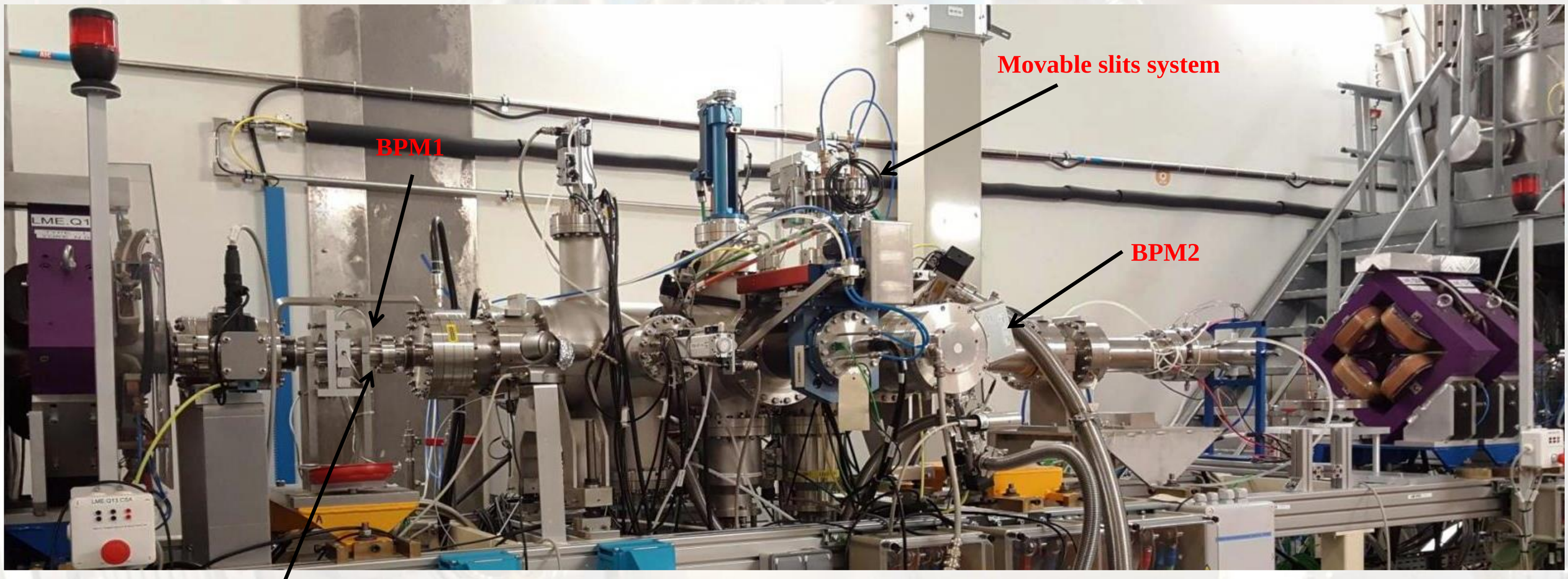
RESULTS OF SPIRAL2 BEAM POSITION MONITORS ON THE TEST BENCH OF THE RFQ

Mohammed Ben Abdillah, Patrick Ausset, Institut de Physique Nucléaire, Orsay

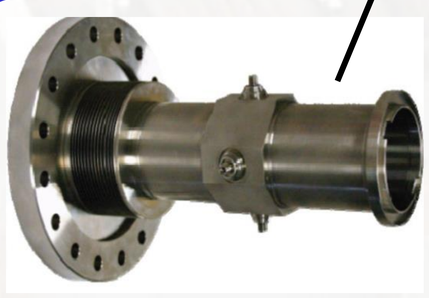
R.Ferdinand, C.Jamet, V.Langlois, Grand Accélerateur National d'Ions Lourds, GANIL, Caen, France

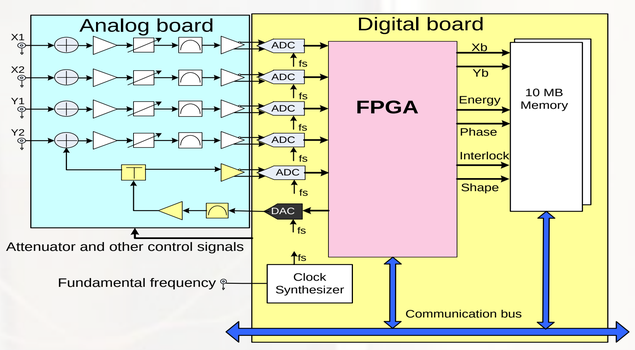
Abstract

SPIRAL2 project is based on a multi-beam superconducting LINAC designed to accelerate 5 mA deuteron beams up to 40 MeV, proton beams up to 33 MeV and 1 mA light and heavy ions (Q/A = 1/3) up to 14.5 MeV/A. The accurate tuning of the LINAC is essential for the operation of SPIRAL2 and requires measurement of the beam transverse position, the phase of the beam with respect to the radiofrequency voltage, the ellipticity of the beam and the beam energy with the help of Beam Position Monitor (BPM) system. The commissioning of the RFQ gave us the opportunity to install two BPM sensors, associated with their electronics, mounted on a test bench. The test bench is a D-plate fully equipped with a complete set of beam diagnostic equipment in order to characterize as completely as possible the beam delivered by the RFQ and to gain experience with the behaviour of these diagnostics under beam operation. This paper addresses the measurements carried with the two BPMs on the Dplate: energy, transverse position and ellipticity under 750 KeV proton beam operation.



SPIRAL2 BPM AND READOUT ELECTRONICS

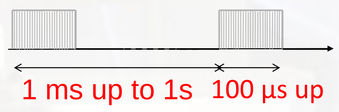




Readout electronics performing phase, position and ellipticity measurements based on BPM sensors output signals tone at F or 2*F

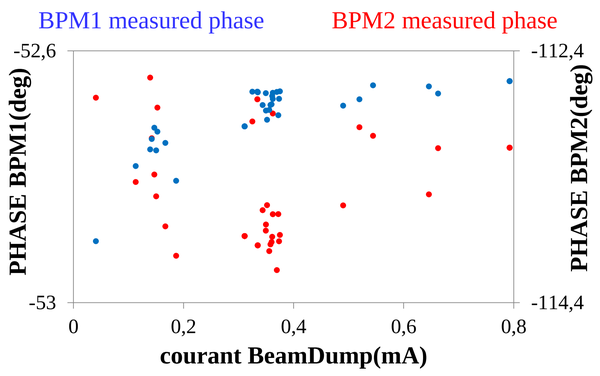
SPIRAL2 LINAC BEAMS AND PARTICLES

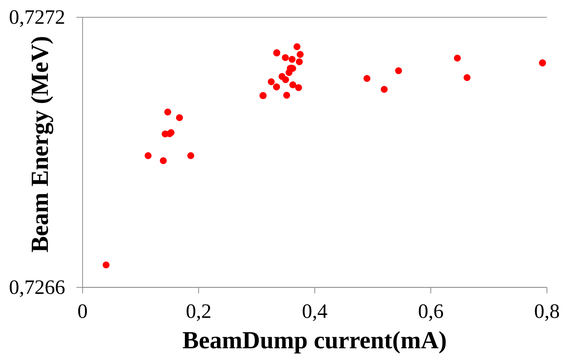
Particle	Current(mA)	Energy(MeV/u)
Proton	0.15-5	2 -33
Deuteron	0.15-5	2 -20
Q/A = 1/3	0.15-1	2 -14.5
Q/A = 1/6	0.15-1	2 -8



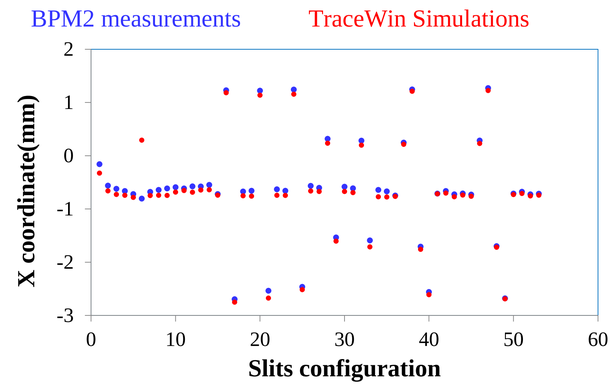
Bunch operating Frequency: ***F***=88,0525 MHz

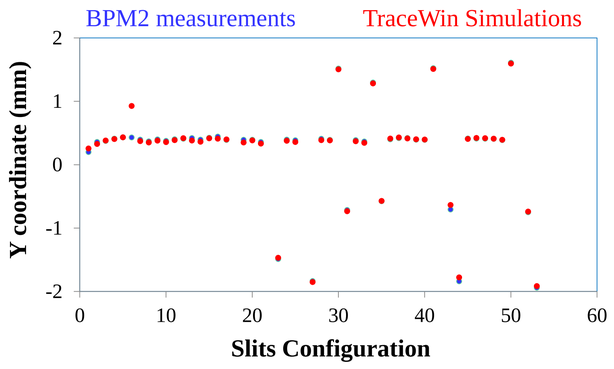
BEAM PHASE AND ENERGY



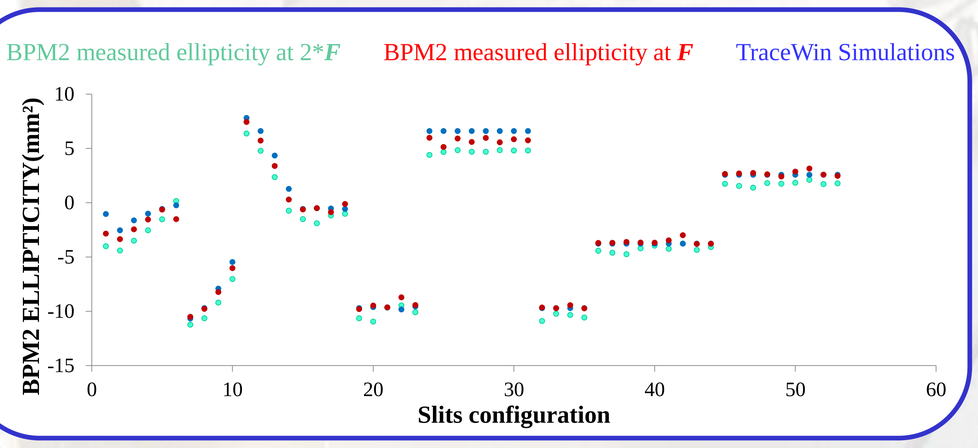


BEAM POSITION (X,Y) COORDINATES





BEAM ELLIPTICITY



CONCLUSION

- Two BPM sensors with their associated electronics for the Linac of SPIRAL 2 have been put on operation on the SP2-ITB on 2018.
- **Beam Energy**: measurements are successful and within accelerator specifications ($\Delta E/E<10^{-3}$).
- **Beam transverse position**: measurements with 50µm to 100µm precision which is within specifications (less than 150µm).
- **Beam phase with respect to the RF signal**: measured with 0.4deg precision which is within specifications (less than 1deg).
- **Beam Ellipticity**: Deep investigations were made concerning the ellipticity sensitivity. The results show a good agreement between TraceWin simulations and BPMs corrected measurement at low β beams and both harmonics. The 20% precision asked by specifications is fulfilled.