Finemet cavity tests

The tests were hugely successful.

We aligned the C02 & Finemet cavities so that we could use them in parallel, then we used the various combinations of Finemet, C02, C04 and C16 to produce all H1+H2 type beams, ending up with C02=4.5kV, C04=4.5kV, C16=0.9kV, Finemet H1=3.5kV, Finemet H2=3.5kV. This allowed us to test the Finemet with both harmonics accelerating maximum intensity of 820E10 for 26 out of 38 cycles in the supercyle and observe the heating of the amplifiers. This test proved that we have plenty margin for present beam intensities, as the water temperature went from 27 to 41C where it stabilized,  the protection would have kicked in at 70C but was not needed.

(Alan Findlay on behalf of the Finemet team)

The new RF power system is capable of providing a maximum voltage of 7kV (instead of nominal 8kV of C02 and C04) while the digital low level electronics has four channel to treat four frequencies at once. The ensemble can be used alone or in conjunction with the existing C02 and C04 systems.

So far we could accelerate a beam of 800E10 protons using the new system at fundamental frequency and C04 as second harmonic then C02 at fundamental frequency and the new system as second harmonic. We finally used the Finemet system at double harmonic. It provided 3.5kV at h=1 and h=2, the missing voltage being provided by the C02, C04 cavities. Here again the same beam intensity could be safely handled even covering 26 users out of 38 present in the super cycle (~70% duty cycle). The digital electronics proved extremely flexible and user friendly and provided wake fields cancellation roughly estimated in above 20dB (to be confirmed).

(Mauro Paoluzzi on behalf of the Finemet team)