

Integration Open Questions

(some urgent questions only ...)

- ◇ **Position of the couplers ?**
- ◇ **Will there be a separate cryoline?**
- ◇ **Architecture of the RF power:**
 - ◇ **Number of cavity per klystron ?**
 - ◇ **Size of the modulators for LP-SPL and HP-SPL versions ?**
 - ◇ **In case of one klystron for 2 cavities (or more?),
where do we install the waveguide splitting?**
- ◇ **Can we have 80m long waveguides?**

Position of the couplers ?

- ◇ **Coupler should be vertical:**
 - ◇ Reduces stress on ceramic during transport
 - ◇ Improved stability of the antenna
- ◇ **Arguments for locating the coupler below the cavity**
 - ◇ Couplers are more complex and difficult to clean than cavities: experience from SNS and Jefferson Lab is that dust particles keep falling from the couplers ...
 - ◇ Couplers below allows to better optimize the space for the cryogenics headers after the introduction of the cavity train with mounted couplers inside the cryostat.
- ◇ **Still, no reason to support the modules from the ceiling and they will be installed on jacks sealed on the tunnel floor**

Will there be a separate cryoline?

- ◇ Heat load of HP-SPL may require a separate cryoline
- ◇ Fine cryogenic sectorisation is very attractive:
 - ◇ Fast exchange of module – no need to warm-up a long string
 - ◇ Warm sector valves to limit the propagation of air + dust in case of leakage or valve manipulation hiccup
 - ◇ Flexibility to re-arrange the modules according to their performances
- ◇ Tunnel size and integration layout will leave the possibility to install a separate cryoline

Architecture of the RF power:

- ◇ Number of cavity per klystron?
 - ◇ LP-SPL baseline is IOT (one per cavity) in the $\beta=.65$ region and 2 cavities per klystron in the $\beta=1$ region
 - ◇ HP-SPL would require to double the number of klystrons in the $\beta=1$ region
- ◇ Size of the modulators for HP-SPL versions ?
 - ◇ Modulator for the HP-SPL would be in the $\geq 10\text{m}^2$ per cavity
→ difficult to envisage 240 of those underground!
 - ◇ Splitting of the modulator (capacitor charger on surface and pulse former in tunnel) still needs to be studied
 - ◇ Magnetron power sources could allow a large gain of underground space, but the technique still needs to be verified
- ◇ Can we have 80m long waveguides?
 - ◇ Ok for feed-back system
 - ◇ Important dissipated heat load ($\sim 7\%$ of RF power), should try to use large (WR1150) waveguides
 - ◇ One waveguide per cavity is confirmed whatever the layout

