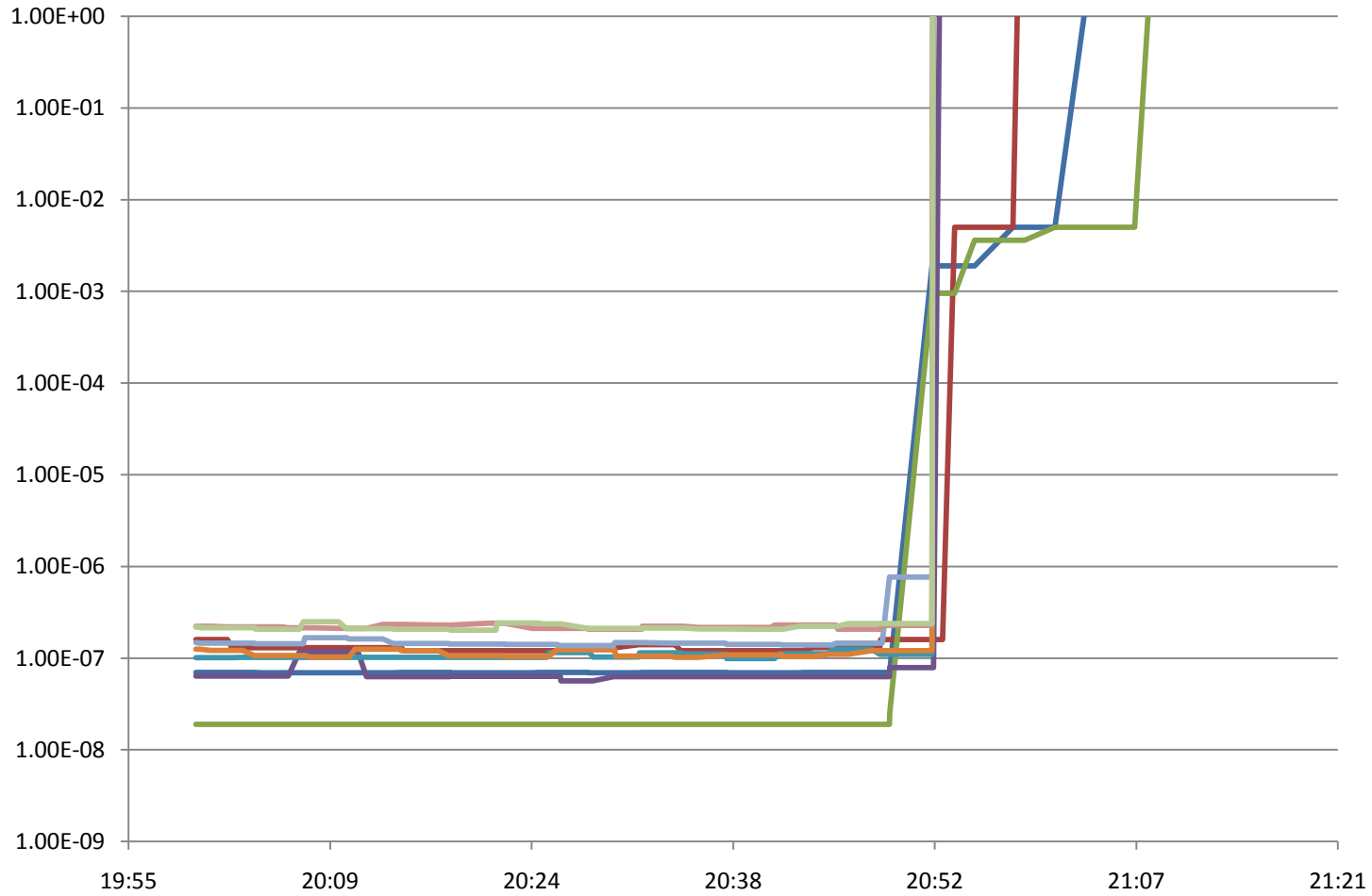


Linac 2 leak on 28th August

G.Vandoni, on behalf of

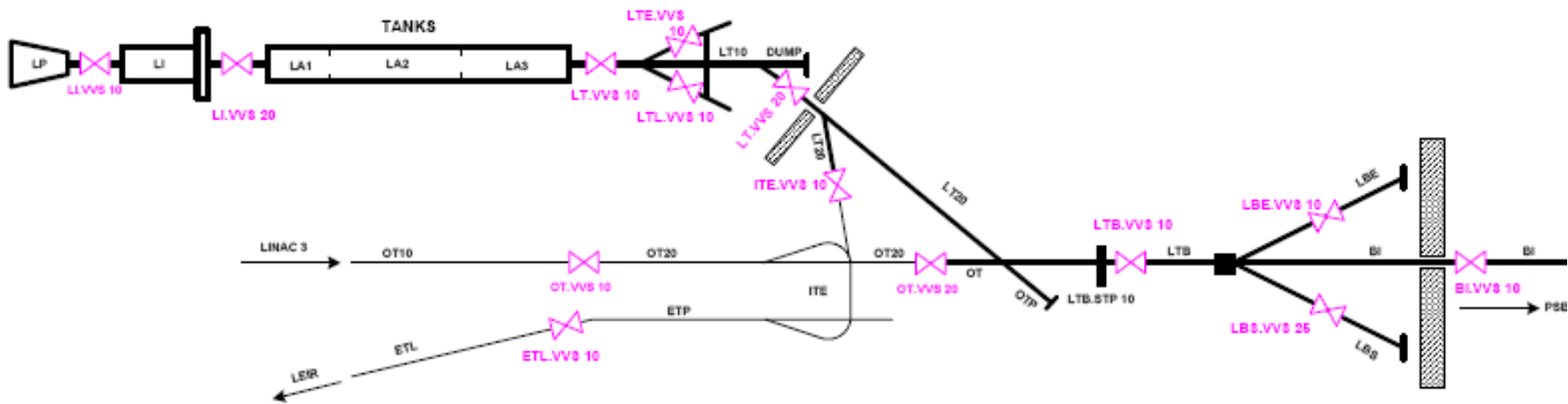
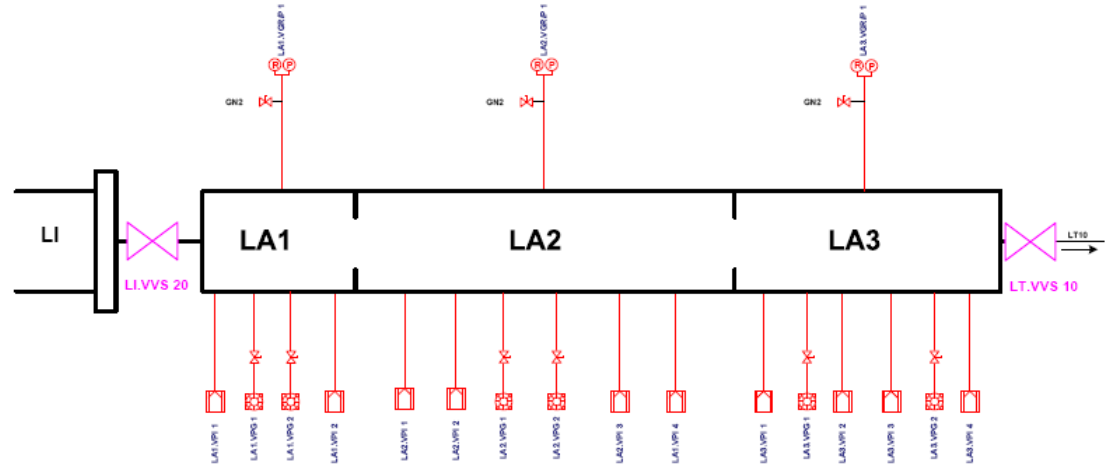
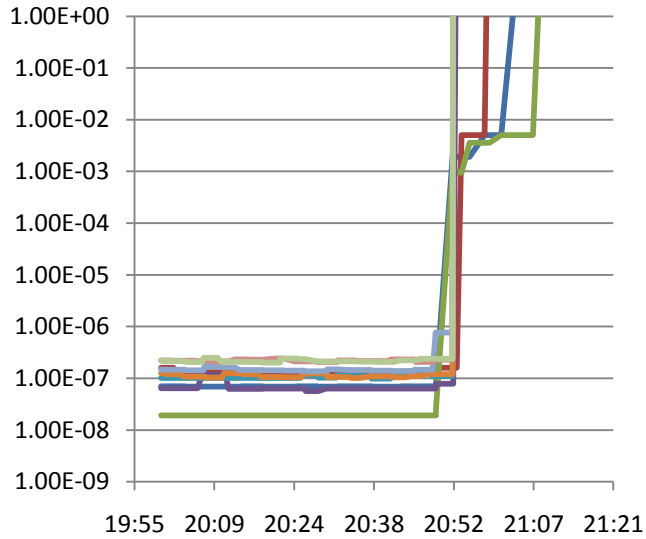
All involved colleagues from TE/VSC, BE/ABP, BE/RF

Leak!



28th August, 20:50

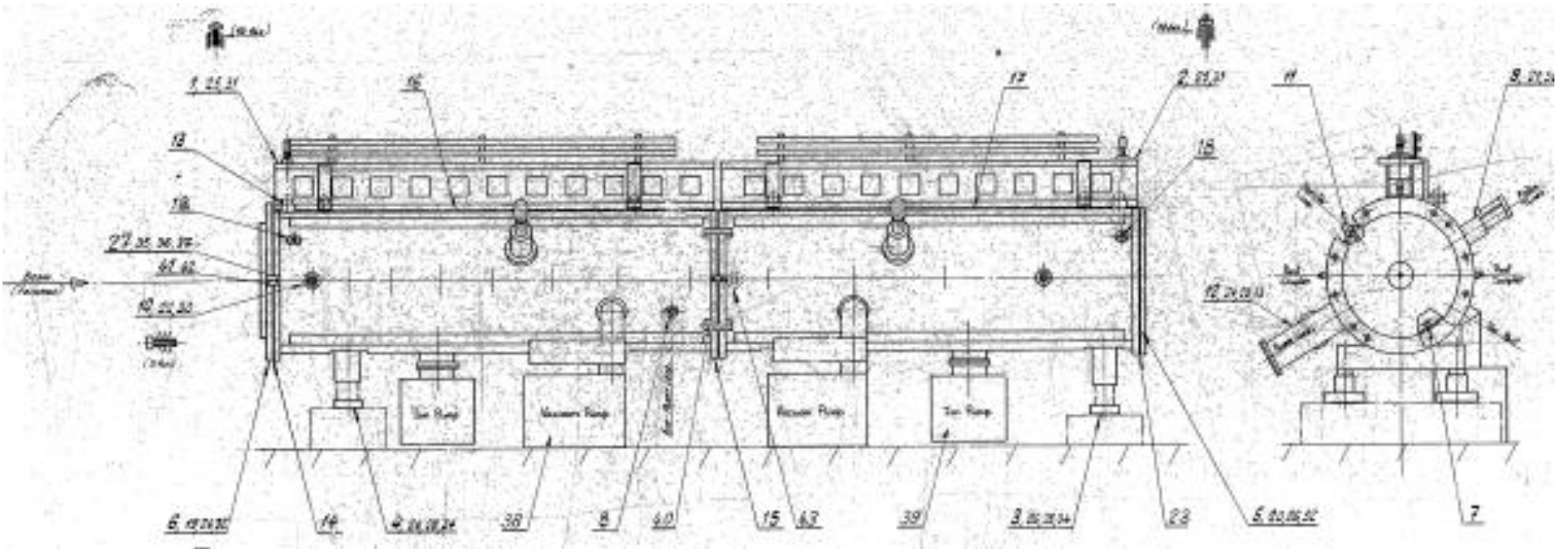
Leak!



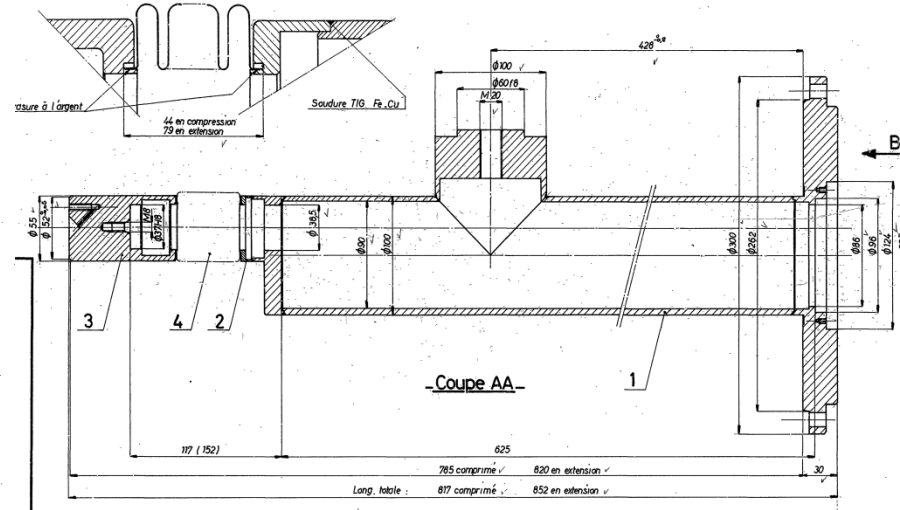
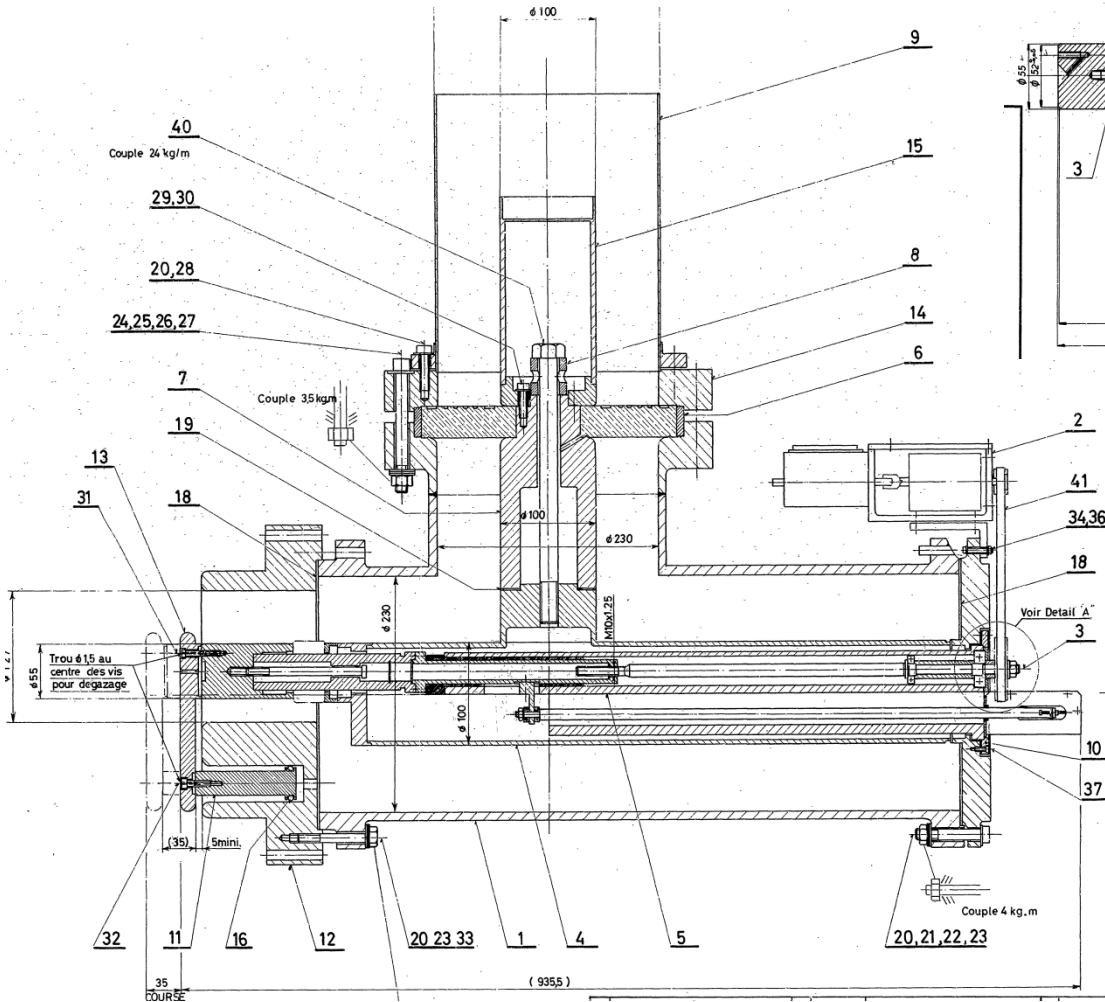
Leak detection

- Pumping speed: 1000l/s. Ultimate pressure: 10^{-3} mbar => leak of 1 mbar l/s **BIG**
- Friday night: small leak found on Q5 of tank 2
- Saturday: leak on Q5 is evaluated quantitatively and results to be too small, so leak detection continues to analyze the girder
- Sunday: girder entirely analyzed, several smaller leaks
- Monday: RF feeder loops on tank2 are opened, the leak is found there.

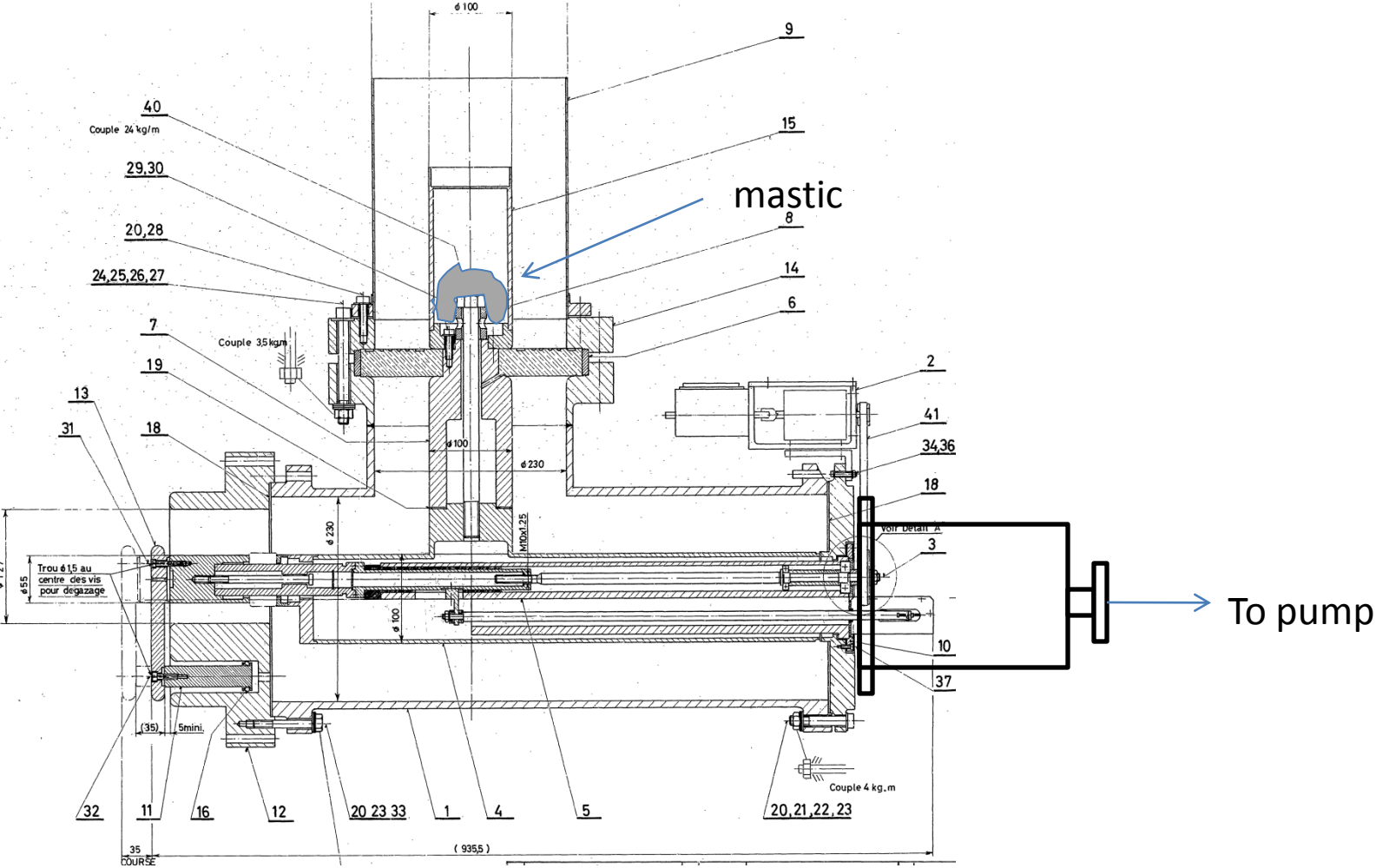
Tank 2



RF feeder loop



Leak (temporary) repair



Maurizio's report

In the early afternoon of Monday the leak was eventually located on the inner conductor of the upstream RF coupler of Tank2. The leak has been fixed by the vacuum group applying differential pumping on the outside of the coupler. This has required removing the motor and the mechanism allowing to change the coupler position, but this will have no effect on the operation, the coupler being fixed on the position of maximum beam current since many years. We do not know the exact position of the leak, because to trace it one should have disassembled the coupler breaking the tank vacuum, but we suspect the bellow that allows the coupler movement, which is the most critical item in the leaking region. It is not easy to understand why such a bellow can develop a leak after 30 years of operation. The coupler is not cooled, and there is no water around it that could induce corrosion. The only hypothesis that I can express is that because the bellow is silver brazed to the copper inner conductor, some brazing alloy could have dripped inside the coaxial at the moment of construction, causing some multipactoring to develop in that region when powered with the RF. We have already seen in similar cavities that multipactoring can go on for many years in some regions during the normal functioning of the cavity, undetectable from the outside, but eventually damaging the surfaces (vaporisation of the material). If this is the case, after years of slowly vapourising the brazing alloy, a discharge on Friday night has opened up a leak. By the way, this hypothesis could also explain some asymmetries in the RF behaviour of the 2 couplers of Tank2 that we have seen in the past. But unfortunately we can not verify it because we do not want to take the risk of venting the delicate tanks to look into the coupler.

In case this explanation is correct, we clearly take a risk in going on with the operation without solving the problem. On the other hand, these processes are very slow, and if it has taken 30 years to develop a leak, we can reasonably assume that it will take a few more years before a crack is opened in the bellow, which would cause its overheating and break it completely. What we foresee now is to prepare (test and clean) the spare RF coupler in such a way that it is ready for a quick replacement in case of problems with the bellow. At this point, the problems could only come from the RF because the differential vacuum applied can probably stand a slight worsening of the leak. The replacement would not be easy (the coupler weights 130 kg) and would require venting of the tanks, but the intervention can be probably compressed in about 0.5-1 day.