Discussion on "Processing of the First French Spoke Cavity" by Sebastien Bousson

The discussion started with BCP issues. It was pointed out that etching rates are very dependent on flow and temperature and that special efforts have to be made to achieve homogeneous etching rates in spoke resonators. Delayen and Krawczyk pointed out that Jlab had experienced a factor of two difference in etch-rate already for elliptical cavities. A flow-diverter helped to improve the situation. Shepard and Kelly added that they needed a recirculating system through all spoke cavity ports to suppress bubble creation and improve homogeneity. One might even have to consider rotating a cavity. The sketch of the BCP system to be used in Orsay has a cavity orientation that has the beam pipes on top and bottom of the stand. In this orientation gas would be trapped in the top part of the end cap. Orsay will reconsider the BCP setup.

Next the HPR system was addressed. Orsay uses an electropolished stainless steel nozzle. While Jlab for this type of nozzle experiences corrosion, LANL checked this type of nozzle by dissection and did not find any corrosion, even after years of use of one of their nozzles. Shepard noted that this might be an effect of the actual water pressure and the size of the holes. Again, the sketch of the HPR system shown meant stagnant flow for the water. Bousson acknowledged that this needs to be addressed. While their first setup will have to be done in this orientation, a future redesign is worked on.

Details of the cavity treatment were clarified next: The water is not cleaned with ethanol after the HPR, it is not dried with nitrogen gas, but only in laminar air-flow in the cleanroom. For the future they are thinking about in-situ baking to reduce the Q-slope of these structures. This latter approach was questioned, as it does not address the low field slope, but the less important high-field slope. Tests at ANL did show little effect of this baking.

Further comments on heat-treatment warned of undesired effects: in-situ baking will improve the BCS resistance, but it might increase the residual resistance with a negative net result. Also, SNS for a 800 degree Celsius heat treatment experienced too soft cavities (with material from two different vendors). They needed to reduce the temperature to 600 degrees Celsius. Orsay is thinking of using 650 degrees Celsius.

Finally the quenches of the LANL cavity were discussed. Tajima estimated that around 100 W were put into the cavity at the quench level. This indicates that these quenches are not due to a microscopic defect, but due to electron bombardment from field emission. This can result in local thermal instability and film boiling.