

Summary of Inner Tracker Silicon Meeting

at CERN, October 25, 2000

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1 Delivery of Detector/Kiev Sensors

- Delivery of the sensors will be late by two weeks and is now expected for mid November. The reason given by the company was that visual inspection of the 25 oxygenated wafers from CNM/Barcelona showed some surface defects, which forced them to modify their already started mask design.
- We expect the following numbers of “good” sensors (i.e. according to our specifications concerning leakage currents and numbers of bad strips):

	SINTEF oxygenated	Barcelona		total
		oxygenated	non-oxygenated	
with over-metallisation	5	5	1	11
w/o over-metallisation	5	5	1	11
total	10	10	2	22

2 “Acceptance” tests of Detector/Kiev Sensors

- Acceptance tests of all “good” sensors should start immediately, and be finished at latest within 2 weeks, after arrival of the sensors in Lausanne.
- The tests should include:
 - visual inspection under microscope
 - I/V and C/V curves (for whole sensor)
 - coupling capacitance (implant/metal) for each strip
 - inter-strip capacitance for each strip
 - inter-strip resistance for each strip
 - strip resistivity for each strip
- The tests will be carried out either at the Athena setup at CERN, if we can get access there, or in Zuerich. A probe station has been ordered by Philip, it should be available in time for the tests.
- Valery asked us not to be too daring and too demanding with respect to breakthrough voltages for non-irradiated sensors. His experience from HERA-B is that high-voltage performance can improve significantly after irradiation.

*Summary by O. Steinkamp

3 Tests with r/o electronics

- After acceptance tests, one sensor from each of the six categories will be reserved for irradiation tests. The remaining sensors will be distributed between all groups, where each group receives all sensors of one of the categories defined above (this assumes that we really receive the expected number of good sensors). Sensors from CNM/Barcelona wafers will go to Santiago and Lausanne, those from SINTEF wafers to Heidelberg and Zuerich.
- Santiago and Lausanne will use SCTA front-end chips, Heidelberg and Zuerich will use Helix chips. For the SCTA read-out, additional hybrids have to be ordered and pitch adaptors have to be designed and produced. Santiago and Lausanne groups will take care of this. Heidelberg will use Helix hybrids from the HERA-B vertex detector, Zuerich will use Helix PCBs from the HERA-B Inner Tracker. The programming of the chips is different for the two setups, i.e. ladders cannot be easily exchanged between the two groups.
- Mechanics and setups will be prepared by each group individually. We felt that the relatively simple setups do not justify the overhead of a central production, and that local constraints in the different labs would require many modifications to a common design.
- Each group should first connect one sensor to a read-out chip and measure the signal-to-noise performance. This should be done with a Ruthenium source.
- Next, each group will build a ladder using all available sensors. Different groups should concentrate on different aspects:
 - Santiago will compare a real ladder with a setup that uses “meandering strips” on one single sensor to simulate a longer ladder. If the results agree well, this technique could be useful for many tests in the future.
 - Lausanne will concentrate mainly on “mechanical” aspects and build a ladder using materials and techniques that could be used for the real detector.
 - Heidelberg and Zuerich will concentrate on mapping S/N over the surface of the ladder (e.g. charge collection efficiency in between strips). The laser setup in Heidelberg will be very useful for this.

4 Test beams

- With the announced two-week delay, the Detector/Kiev sensors will arrive too late for CERN test beams this year.
- We have to submit our requests for test beam next year:
 - T7 (PS, 10 GeV protons), beam starts beginning of April (week 14). VELO has asked for 2-3 weeks beginning of April, it should be possible that we share this time with them.
 - X7 (SPS, 120 GeV pions and muons), beam starts end of June (week 26). Olaf proposed to ask for one week beginning of July (again together with VELO) and another week end of September. The second period should serve as “backup” in case we achieve not all our aims during the first, or unexpected question arise writing the TDR.

5 Irradiation of Sensors

- If sensors arrive early enough, we will try to irradiate one sensor of each category at CERN still this year. The sensors will be selected after acceptance tests. Michael will check availability of the irradiation facility with Frederik Teubert of the VELO. A flux of 10^{14} protons/cm² (i.e. about twice the maximum flux expected for the Inner Tracker) can be accumulated in about 10h.
- We have to investigate alternatives in case the CERN facility is not available. Since nobody else volunteered, Olaf will look into this.
- Hans suggested that the irradiation profile should be similar to that expected for LHCb, in order to obtain realistic leakage currents.

6 Mechanics, Cooling System

- Olaf expressed his worry about the low level of technical support in our group. So far, M.Hertig from Lausanne is the only engineer who has worked with us, in addition he is now occupied with work for the 3GEM option. We agreed to aim for a full mechanical and thermal model of a half station, a conceptual design of a cooling system, and at least a conceptual design of support frames, for the TDR. This is by far too much work for M.Hertig alone, even if he could work for us 100% of his time. We have to find engineering support elsewhere very urgently.
- Michael pointed out that Heidelberg has an engineer, who is “shared” by the groups in the institute. We have to submit concrete projects in order to get time allocated. On average, we could expect that he will spend about 20% of his time for us.

7 Name for Silicon Inner Tracker

- Three proposals so far: ITS (Inner Tracker Silicon, disadvantage is that ALICE already uses this for their silicon detector), ISIS (Inner Silicon System), and TRAINS (TRacking INner Silicon).
- Please vote by Tuesday night, October 31st, by e-mail to Olaf (deadline is 23h59).

8 Next Meeting

- At CERN, during the next LHCb week (27/11-01/12).