

# Task List for Inner Tracker Technical Design Report

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This document defines a list of tasks and responsibilities for the preparation of the Inner Tracker Technical Design Report. It is based upon a proposal by Olaf Steinkamp and was discussed at the Inner Tracker meeting on May 8, 2001. Responsibilities were assigned in agreement with the following representatives of the respective groups: Michael Schmelling for MPI Heidelberg, Valery Pugatch for Kiev, Minh-Tam Tran for Lausanne (by e-mail), Lev Shekhtman for Novosibirsk, Jose-Angel Hernando for Santiago, and Ueli Straumann for Zürich.

The task list is divided into nine areas of investigation. These do not necessarily correspond to chapters of the Technical Design Report.

1. Environment
2. Silicon Sensors
3. “On-Detector” Electronics
4. Ladders
5. Station Mechanics
6. Infrastructure, Cooling, Power
7. “Off-Detector” Electronics
8. System Performance
9. Project Organization

This task list will be reviewed and updated at monthly Inner Tracker meetings, until the submission of the Technical Design Report.

## 1 Environment

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• particle flux, radiation damage</li> <li>• dimensions sensitive area</li> <li>• resolution, occupancy, multiple scattering</li> <li>• mechanical constraints</li> </ul>	<ul style="list-style-type: none"> <li>• decide layout tracking system (w/ Tracking Task Force) — O.Steinkamp</li> <li>• radiation levels with new layout _____ L.Shekhtman</li> </ul>

## 2 Silicon sensors

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• geometry, strip pitch</li> <li>• strip capacitance</li> <li>• charge-collection efficiency</li> <li>• depletion voltage, leakage currents, operating temperature after irradiation</li> </ul>	<ul style="list-style-type: none"> <li>• measurements SPA-Detector sensors _____ O.Steinkamp (coordination)</li> <li>• simulation alternative layouts, e.g. intermediate strips _____ F.Lehner</li> <li>• calculation NIEL, depl. voltage, leakage currents _____ F.Lehner</li> </ul>

### 3 “On-Detector” Electronics (Front-End, Digitisation, Data Link)

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• noise performance</li> <li>• signal shape</li> <li>• digital resolution</li> <li>• data link type</li> <li>• location, radiation hardness components</li> <li>• material budget</li> <li>• cost</li> </ul>	<ul style="list-style-type: none"> <li>• measure Beetle parameters _____ D.Baumeister</li> <li>• measure radiation hardness Beetle _____ S.Loechner</li> <li>• study link options _____ A.Vollhardt</li> <li>• study FADC options _____ A.Vollhardt</li> <li>• build data link test setup _____ A.Vollhardt</li> <li>• design front-end hybrid _____ A.Vollhardt/C.Bauer</li> <li>• ECS interface _____ T.Glebe</li> </ul>

### 4 Ladders

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• mechanical stability</li> <li>• temperature profile (sensors and hybrid)</li> <li>• sensor alignment</li> <li>• material budget</li> </ul>	<ul style="list-style-type: none"> <li>• build mechanical/thermal model of ladder _____ M.T.Tran</li> <li>• finite-element calculations? _____ F.Lehner</li> <li>• develop assembly / sensor alignment procedure _____ M.T.Tran</li> </ul>

## 5 Station Mechanics

	Critical Parameters	Work to be done (Responsibility)
box	<ul style="list-style-type: none"> <li>• thermal insulation</li> <li>• electrical shielding</li> <li>• material budget</li> </ul>	<ul style="list-style-type: none"> <li>• select materials _____ (Zuerich)</li> <li>• build model _____ (Zuerich)</li> </ul>
support frames	<ul style="list-style-type: none"> <li>• mechanical stability</li> <li>• ladder alignment</li> <li>• cooling pipes</li> <li>• signal cables</li> <li>• space requirements</li> <li>• material budget</li> </ul>	<ul style="list-style-type: none"> <li>• optimize materials and geometry _____ (Zuerich)</li> <li>• finite-element calculations? _____ (Zuerich)</li> <li>• build model _____ (Zuerich)</li> </ul>
patch panel	<ul style="list-style-type: none"> <li>• thermal insulation</li> <li>• feedthroughs</li> <li>• mechanical stability</li> <li>• alignment support frames</li> <li>• material budget</li> </ul>	<ul style="list-style-type: none"> <li>• basic design _____ (Zuerich)</li> <li>• materials and geometry _____ (Zuerich)</li> <li>• finite-element calculations? _____ (Zuerich)</li> <li>• build model _____ (Zuerich)</li> </ul>
support beams	<ul style="list-style-type: none"> <li>• fixation to Outer Tracker</li> <li>• mechanical stability</li> <li>• station alignment</li> <li>• material budget</li> </ul>	<ul style="list-style-type: none"> <li>• basic design _____ (Zuerich)</li> <li>• materials and geometry _____ (Zuerich)</li> <li>• finite-element calculations? _____ (Zuerich)</li> <li>• rails on OT frames? _____ (Zuerich)</li> <li>• basic idea on alignment system? _____ (Zuerich)</li> </ul>

## 6 Infrastructure, Cooling, Power

	Critical Parameters	Work to be done (Responsibility)
cooling system	<ul style="list-style-type: none"> <li>• cooling power, cooling agent</li> <li>• distribution</li> <li>• safety, radiation damage?</li> </ul>	<ul style="list-style-type: none"> <li>• select cooling agent _____ B.Adeva</li> <li>• basic design distribution system _____ B.Adeva</li> </ul>
low-voltage high voltage	<ul style="list-style-type: none"> <li>• distribution</li> <li>• choice of cables</li> <li>• monitoring</li> <li>• stability</li> <li>• location power supplies, radiation damage?</li> <li>• grounding scheme</li> </ul>	<ul style="list-style-type: none"> <li>• basic design of system _____ B.Adeva</li> </ul>
radiation monitoring	<ul style="list-style-type: none"> <li>• choice of monitors</li> <li>• choice of locations</li> <li>• integration</li> </ul>	<ul style="list-style-type: none"> <li>• basic layout _____ V.Pugatch</li> </ul>

## 7 “Off-Detector” Electronics

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• location of components</li> <li>• design (if different from VELO)</li> </ul>	<ul style="list-style-type: none"> <li>• cost optimization _____ Y.Ermoline</li> <li>• redesign components, depending on choice of data link ____ Y.Ermoline</li> <li>• ECS interface _____ Y.Ermoline</li> </ul>

## 8 System performance

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• resolutions, efficiencies</li> <li>• tracking performance, physics performance</li> <li>• robustness wrt deteriorated detector performance</li> </ul>	<ul style="list-style-type: none"> <li>• simulation studies (w/ Tracking Task Force) _____ A.Polouektov</li> <li>• simulation with deteriorated detector performance? ____ A.Polouektov</li> </ul>

## 9 Project Organization

Critical Parameters	Work to be done (Responsibility)
<ul style="list-style-type: none"> <li>• production sites</li> <li>• manpower requirements</li> <li>• production schedules</li> <li>• cost distribution</li> </ul>	<ul style="list-style-type: none"> <li>• identify production sites _____ O.Steinkamp</li> <li>• estimate manpower requirements _____ J.A.Hernando</li> <li>• establish production schedules _____ J.A.Hernando</li> <li>• overall summary/distribution cost _____ U.Straumann</li> </ul>