

LCUK SILICON
KICKOFF MEETING
BRISTOL

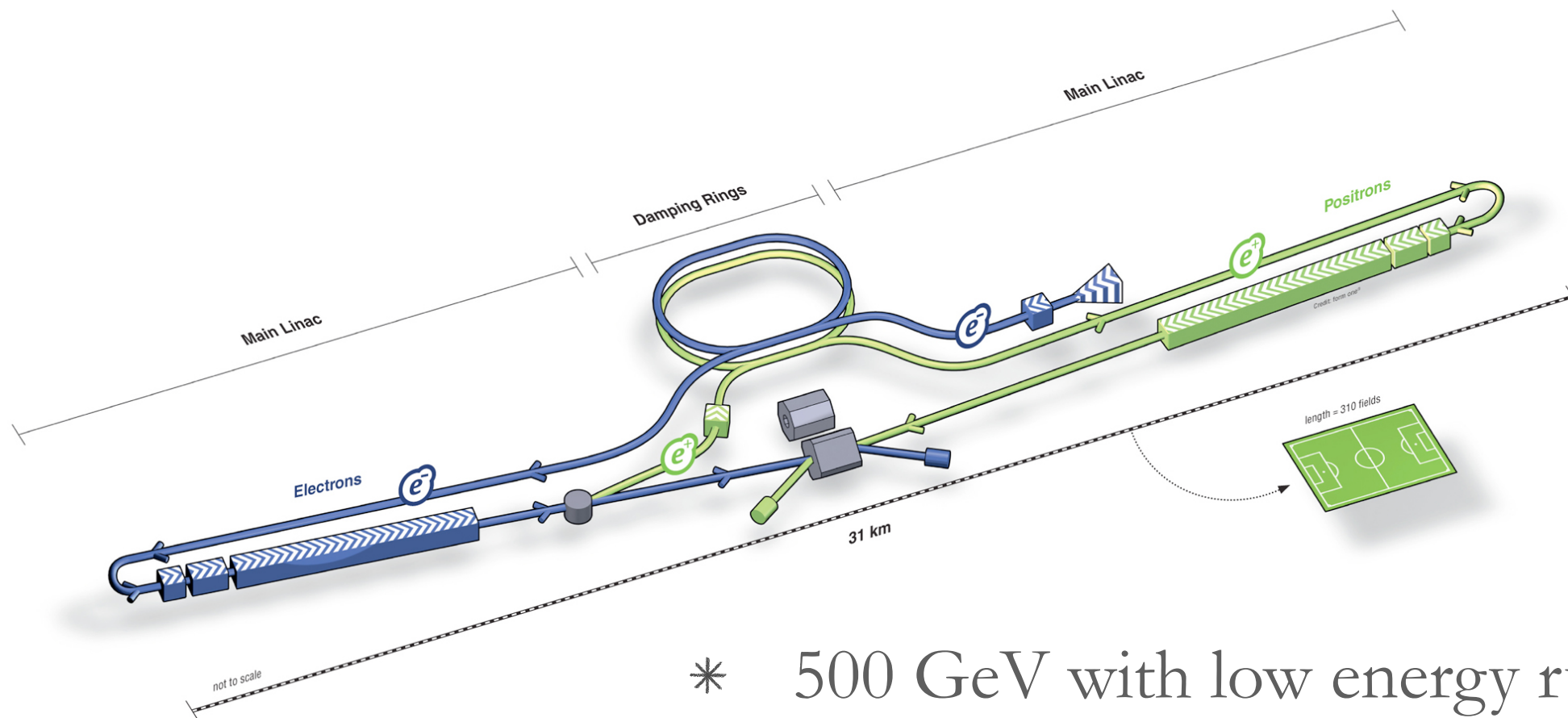
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20/11/14

Introduction

- * Today's Purpose:
 - * Introduction to ILC & tracking for newcomers
 - * Kick-start thinking about ILC pixel tracking
 - * Discuss plans for next two years in likely funding scenarios
 - * Go away and start working
- * Two proper talks:
 - * Introduction
 - * 2011 SPT proposal
- * Round-table and discussions - flexible timing
- * Extra discussion on AIDA2020 for those involved

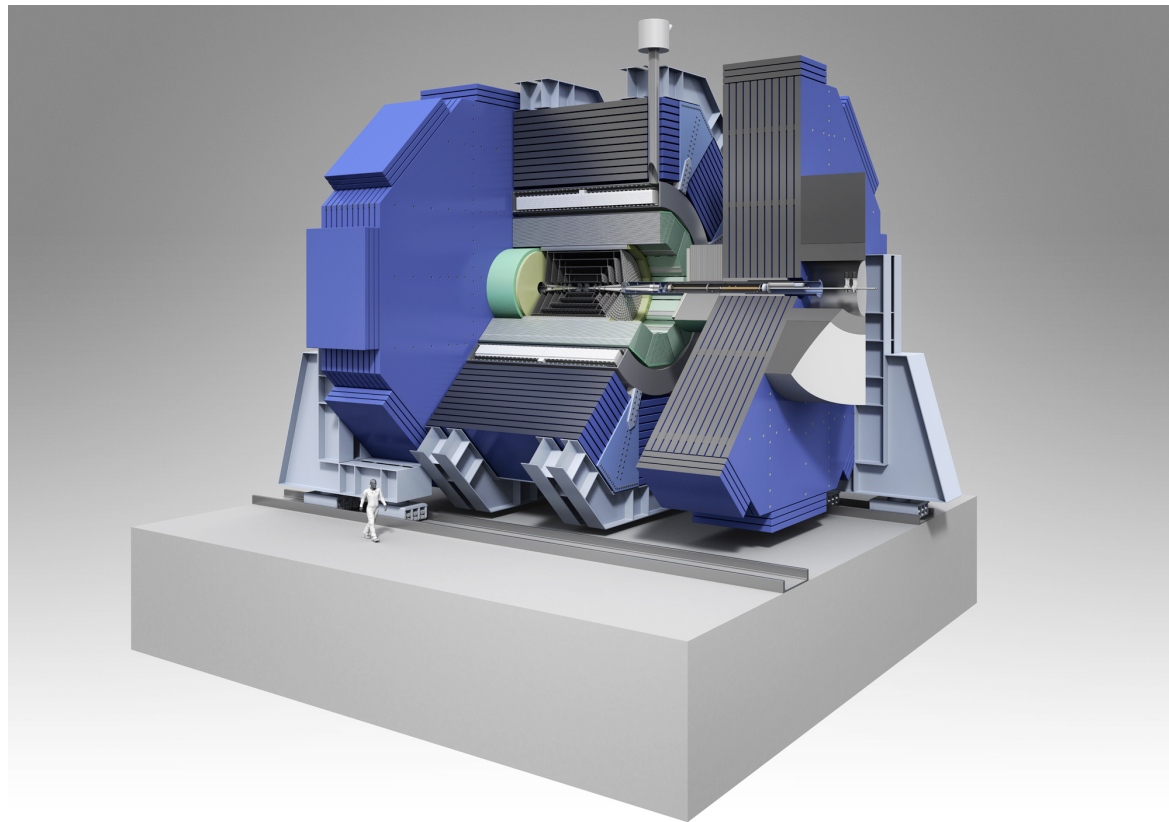
The ILC



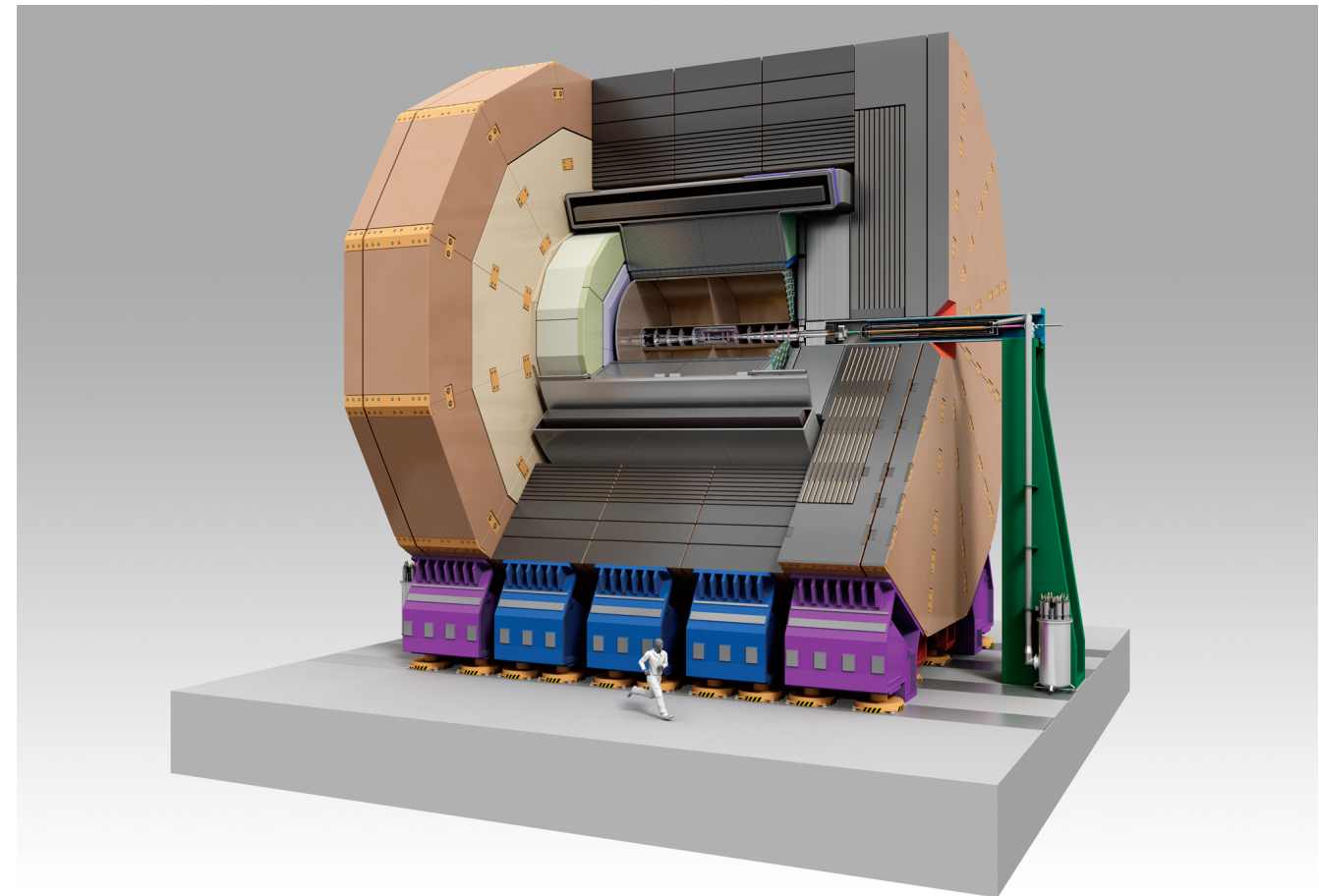
ILC Scheme | © www.form-one.de

- * 500 GeV with low energy running
- * Upgrade to 1 TeV
- * Two detectors in push-pull configuration
- * Beam structure:
 - * 1312 bunches with 554 ns spacing
 - * 5 Hz repetition

Detector Concepts



- * SiD
- * Compact, 5T
- * All silicon tracking

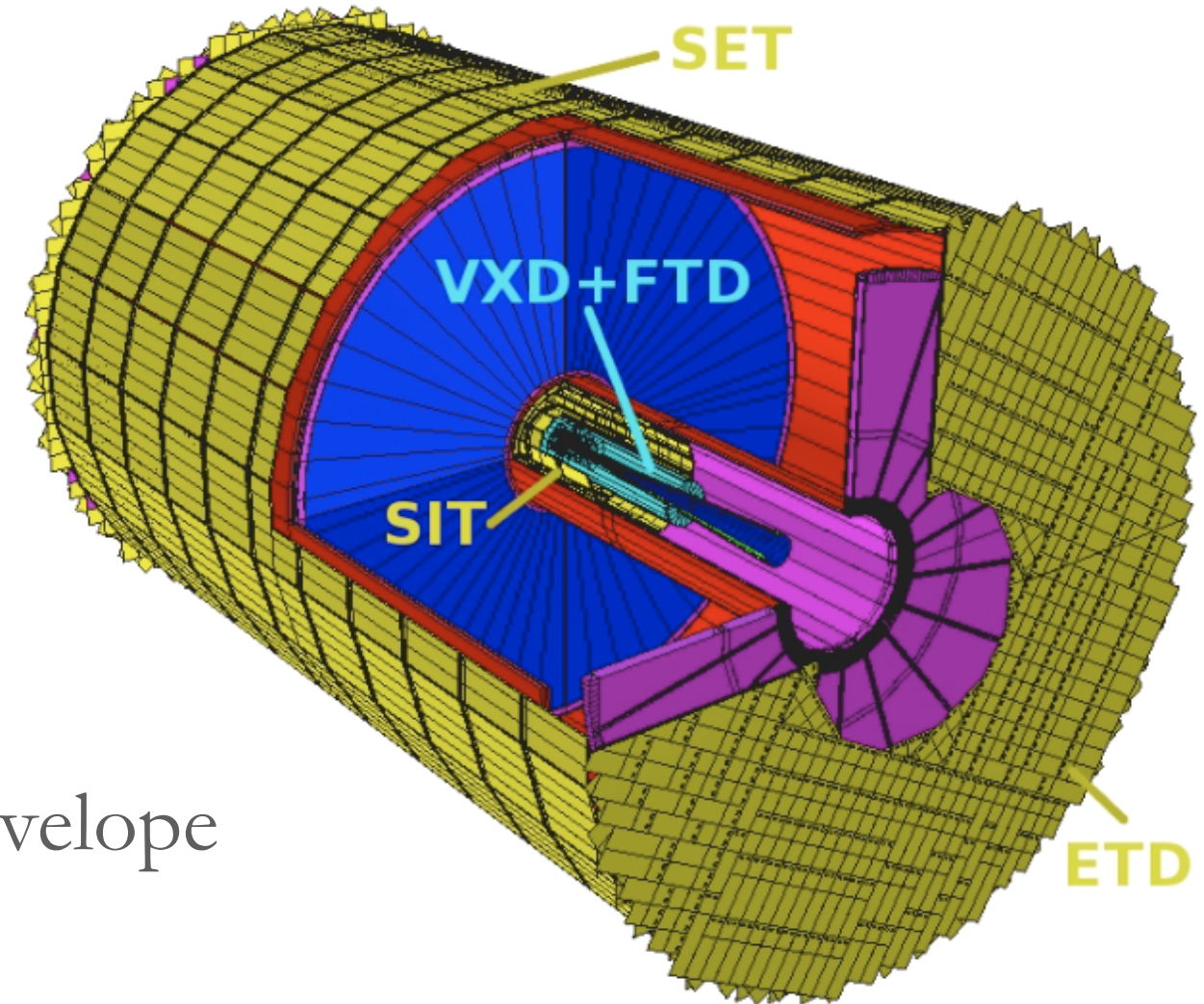
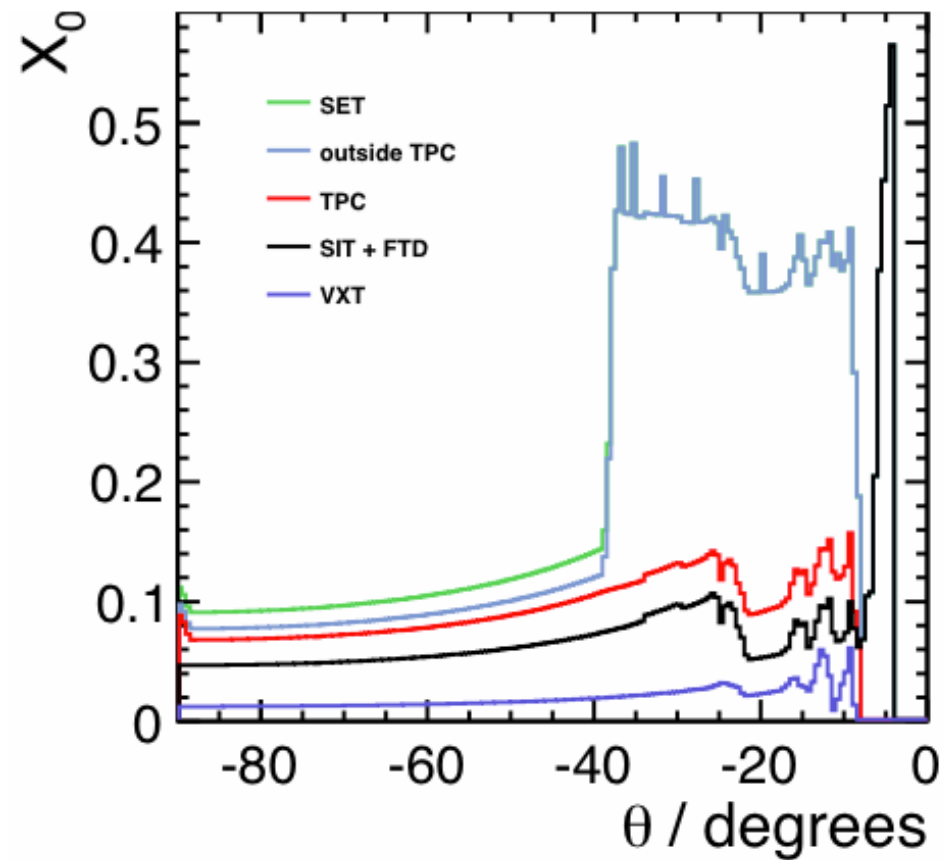


- * ILD
- * 3.5T Field
- * TPC + silicon

Physics Drivers

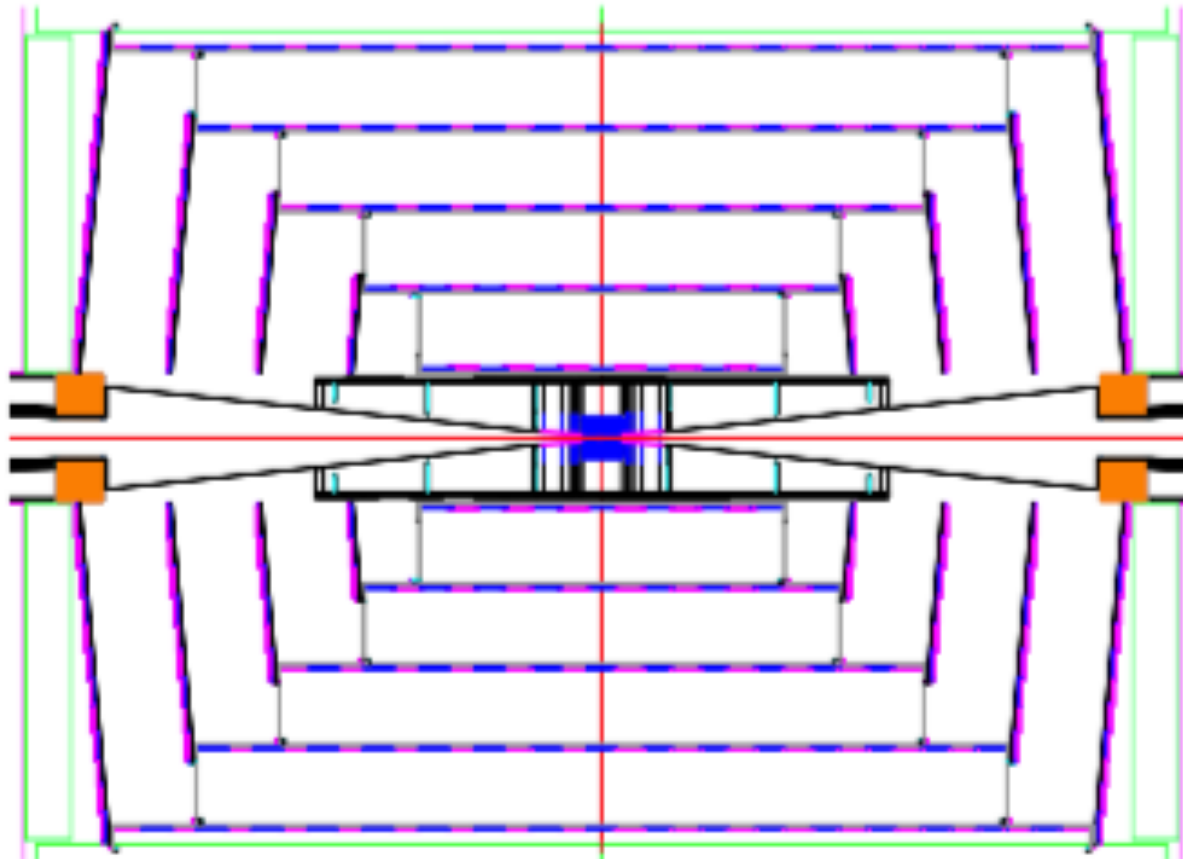
- * Key measurements in Higgs sector
 - * Higgs hadronic WW/ZZ separation
 - * Particle flow calorimetry
 - * Tracks in jets must be matched to calorimeter deposits
 - * Higgs recoil from $Z \rightarrow \mu\mu$
 - * $\Delta p/p^2 \leq 5 \times 10^{-5} / \text{GeV}$
- * $\gamma\gamma$ collisions produce ~ 1 hadronic event per bunch

ILD Tracking



- * TPC with silicon strip envelope
- * Outer radius 1.8 m
- * Length +/- 2.4 m

SiD Tracking



Barrel Region	R (cm)	Length of sensor coverage (cm)	Number of modules in ϕ	Number of modules in z
Barrel 1	21.95	111.6	20	13
Barrel 2	46.95	147.3	38	17
Barrel 3	71.95	200.1	58	23
Barrel 4	96.95	251.8	80	29
Barrel 5	121.95	304.5	102	35
Disk Region	z_{inner} (cm)	R_{inner} (cm)	R_{outer} (cm)	Number of modules per end
Disk 1	78.89	20.89	49.80	96
Disk 2	107.50	20.89	75.14	238
Disk 3	135.55	20.89	100.31	438
Disk 4	164.09	20.89	125.36	662

- * Silicon strip tracker
- * Coverage to $\sim 10^\circ$
- * $\sim 1\%$ X_0 per layer
- * Total $< 0.15\%$ in barrel $< 0.25\%$ in endcap
- * $50\mu\text{m}$ readout pitch with intermediate strips

Proposal & Politics

- * Japanese expected to make decision in 2016
 - * We asked STFC for £74k-£198k pa
 - * £49k pa + CG effort for silicon
 - * PPRP went OK, outcome not known until next SB
1. Determine tracker performance requirements in central and forward regions as a function of radius and azimuthal angle
 2. Evaluate performance (resolution, two-hit resolution, timing, power consumption etc.) of potential sensor technologies
 3. Initial simulations of potential dedicated pixel architectures
 4. Develop conceptual designs including realistic material budgets including support and services
 5. Evaluate tracking performance of designs through physics simulation