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AIDA infrastructure for a tungsten/scintillator HCAL prototype

This document is meant as basis for discussion about creating a possible infrastructure for compact tungsten/scintillator HCAL prototyping within the AIDA project. The project shall allow for providing a generic infrastructure for a compact ILC or CLIC hadron calorimeter, based on particle flow. It will allow to address crucial requirements for the next generation of linear collider detectors, such as compact readout integration, power pulsing, calibration systems, manufacturability, cooling and services.

The R&D addressed with the use of this infrastructure is:

- Development of integrated electronic readout systems compatible with compact active layer integration and reduced power dissipation
- Development of fast scintillators and SiPM compatible with CLIC time stamping requirements
- Test of simulation models for tungsten-based HCAL

Item	First resource estimate (direct cost)	% asked from EU	Institutes interested?	Comment
Scintillator and SiPM test stand, including tests of time-stamping capabilities	36 pm +30 k	30%	MPI+CERN	With ITEP (ass.)
Mechanical integration facility of scintillator plane	18 pm + 100 k	30%	DESY	Partly subsistence for Russian colleagues
Asics for time analysis	36 pm + 100 k	30%	Heidelberg, LAL?	IP blocks to WP3
Integration of readout electronics and power pulsing	36 pm + 60 k	30%	DESY+LAL	
Adaptive power supply	24 pm + 30 k	30%	Prague	To be included in WP10
Signal calibration system test stand	24 pm + 40 k	30%	Wuppertal	
Procurement of tungsten and mechanical manufacturability of tungsten stack.	18 pm + 20 k	30%	CERN +DESY	
Detector cooling studies	18 pm + 20 k	30%	DESY	
Optimisation of Geant4 simulation models	24 pm	30%		To be included in WP2
Sum of black	150 pm + 270 k => 1020 kE	310 kE[1]		

[1] In practice this means that approx. 1.6*310 kE would be asked from the EU due to overheads.

Sum of blue	84 pm + 130 k => 550 kE	165 kE		

Although the Tungsten absorber stack (~10 mm tungsten plates) and the Integrated scintillator planes (fitting into ~8 mm radial space) are presented together, for internal purposes they can well be seen as separate developments. The integrated scintillator planes form a next development stage of the HCAL for ILC, including next-generation electronics, integration issues, power pulsing, cooling etc. The tungsten stack is currently mostly motivated by CLIC, as it provides a compact solution for a deep calorimeter. For the thick tungsten plates manufacturability issues like QA, cutting, machining, threading and assembly procedures will be assessed. The more compact tungsten structure, as compared to steel favored for ILC energies, poses more challenging requirements for the integration of electronics interfaces, whjch are also addressed in this project.