

# First ECFA WORKSHOP.

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## The Semi-Digital Hadron Calorimeter (SDHCAL) for future Higgs Factories

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The Semi-Digital Hadron Calorimeter (SDHCAL) is a highly segmented sampling hadronic calorimeter. using large Glass Resistive Plate Chambers (GRPC) as active medium with embedded readout Printed Circuit Board (PCB) hosting 1 cm<sup>2</sup> copper pads (read independently) on one side and ASIC readout chips (HARDROC) on the other side.

A technological prototype of ~1m<sup>3</sup> developed within the CALICE collaboration have shown excellent results in energy resolution and shower separation. Refined analysis techniques are still being developed. Latest developments address improving spatial uniformity and use of the particle incidence angle in the energy reconstruction.

Experiments at future Higgs Factories can require length-scalable GRPCs (maximum 3 meters). To design such detectors, all aspects had to be rethink : gas distribution, PCB with latest HARDROC chip, DAQ interface board, holding cassette and new way to manufacture and assemble the absorber plates.

A new phase of R&D is focused on exploiting time precision, turning the SDHCAL on a 5D device, leading to better shower reconstruction and better showers separation. Multigap RPC (MRPC) can provide excellent time resolution of 50-100 ps. This requires new readout chips, PETIROC ASIC with its internal TDC, and new PCB. Developments related to the MRPC and the needed electronic are ongoing.

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