

## TOPOLOGICAL TRIGGER DEVICE USING SCINTILLATING FIBRES AND POSITION-SENSITIVE PHOTOMULTIPLIERS.

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An approach to a high-quality Level-1 trigger is proposed on the basis of a topological device that will be realised by using scintillating fibres (SciFi) and position-sensitive photomultipliers (PSPM).

A conceptual structure of such a topological trigger device (TTD) is illustrated in Fig. 1 a. It consists of two cylindrical hodoscopes, RH1 and RH2, with the radii of about 50 cm and 100 cm respectively. For the reason of high resolving time required for such a trigger device each hodoscope is divided at the central plane ( $h = 0$ ) into two parts so that the maximum transit time of scintillation light is less than 12 ns. The light signals are transmitted through high-transmission optical fibres to PSPMs located beyond the eventual flux-return yoke of the solenoid.

The device is characterized in particular by its fast associated electronics which allows to

Table 1.

Spatial resolutions	:	$\sigma_\phi \approx 150 \mu\text{m}$ per sub-layer $\approx .90 \mu\text{m}$ with triplets
		$\sigma_z \approx 400 \mu\text{m}$
Two- hit resolution	:	$\approx .0.7 \text{ mm}$
Resolving time per hit	:	$\approx 0.5 \text{ ns}$
Total time spread	:	$\leq 12 \text{ ns}$
Occupancy	:	$\sim 5\%$ (at $L = 10^{34}/\text{cm.s}$ )

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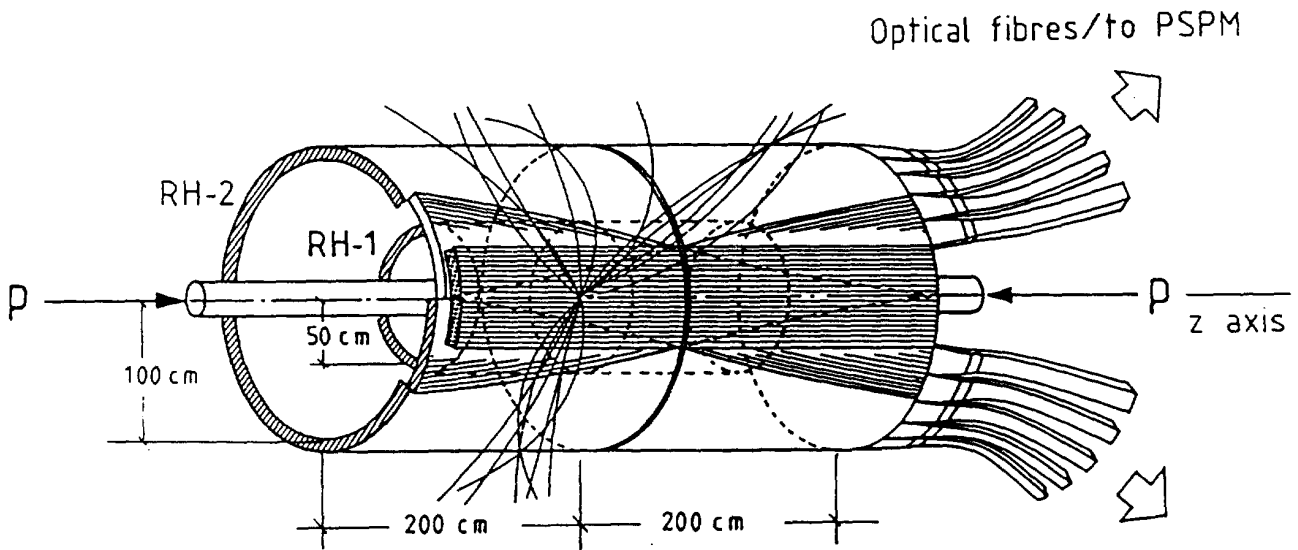
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digitize the hit positions of charged particles in real time. Table 1 presents some expected performances of the TTD based on commercially available PSPMs ( $\sim 1000$  tubes of the type R2486 or  $\sim 500$  tubes of the type R3941-Hamamatsu).

The major interests of such a scheme under the LHC environment reside in:

- i) its capability of selecting high- $p_\perp$  tracks in real time,
- ii) its optional immunity against low- $p_\perp$  tracks and loopers, and
- iii) its capability of matching "in-time" events observed in other associated devices (calorimeter or tracking device).

a)



b)

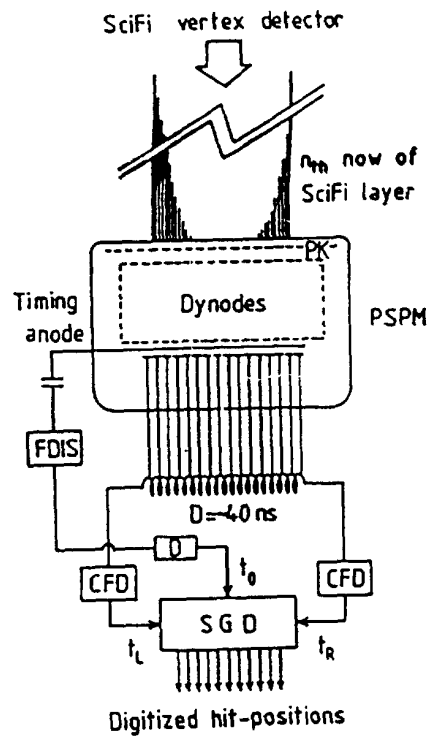


Fig. 1. Conceptual design of the topologies trigger device;  
 a) Mechanical structure, b) Associated electronics.

THE INSTITUTE OF HIGH ENERGY PHYSICS (IHEP)

ACADEMIA SINICA

Beijing, China, 26 Sept. 1991

The Intention Letter

For Further Attending the LAA Collaboration From IHEP

To : Telefax No 41(Switzerland) 22(Geneve) 785.02.07

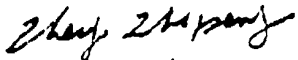
Dear Dr. R. Desalvo and Dr. A. Contin:

We are happy to attend the LAA collaboration of the World Laboratory. Since 1990, Dr YunYong Wang and other three people from IHEP have been at the Collaboration, and made much contribution at the R & D of Spaghetti calorimetry along with Italian colleagues. The work of their group has been reported many times at different international conferences, and caused lots of attention from many physicists. This kind of calorimetries, with its good quality on both energy and space resolution, has shown its huge superiority to be a superhigh energy detector, and has good prospects to be used in the future accelerators such as LHC and SSC.

When Dr YunYong Wang and his Chinese colleagues finish their staying at LAA and come back to IHEP, we'll send Mrs Zhao Mong, Mr ChangYou Yang, Mr He HuiLing, Mrs Liu LiBing and Mrs Xia XiaoMi to LAA to continue the collaboration. These people are experienced on detector, electronics and computer. We believe that they would work well, get along with Italian colleagues and make their contribution, just as the previous group of collaborators from IHEP. In this way, we hope we would give more support to LAA collaboration.

In the meantime, we'll study the possibility of organizing a Chinese domestic group to LAA collaboration. Such a group could continue some research work on the Spaghetti calorimetry in China. However this possibility will depend on the financial and manpower condition of IHEP.

I would like to thank you for your promotion to the collaboration between us, and for your consistent support to our Chinese colleagues.

  
Zheng ZhiPang  
Deputy Director of IHEP



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September 26, 1991

Dr. Riccardo DeSalvo  
LAA project, CERN  
CH-1211 Geneve 23, Switzerland

Dear Riccardo;

We were very pleased to receive the preliminary results of your radiation damage tests. As all the other tests that you have performed with our fiber samples, they will be an invaluable help for further improving the quality of our fibers. We hope that you will be able to continue your radiation damage programme and, from our side, we intend to continue to provide you with the free samples of fibers, that you and me will find necessary for your radiation damage programme and the mass quality control system. In particular, we would like to send to you for testing, a sample of fibers with a new type of cladding. We would like to have your evaluation before commercialization. From the results of your latest radiation tests, the new cladding fibers should combine the good attenuation length of the ST fibers and the higher light output of the RH fibers. Please inform us on the size of the sample necessary for your tests.

Sincerely,

*Tohru Shimizu*

Tohru Shimizu  
Vice President

TS:en