

nanoFIP: a radiation tolerant FPGA-based WorldFIP agent

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WorldFIP is a deterministic fieldbus used in the LHC for the communication with a variety of systems. There are more than 10.000 WorldFIP agents installed all around the LHC tunnel and exposed to a complex radiation field. A new customized version of WorldFIP agents, the nanoFIP, housed in an Actel ProASIC3 FPGA, has been developed at CERN in cooperation with the industry. The paper describes the project's strategy towards radiation tolerance and the results of the radiation testing of the nanoFIP chip with a 230 MeV proton beam at the PSI facility.

Summary 500 words

WorldFIP is a deterministic fieldbus used in the LHC for the communication with a variety of systems. Quench Protection, Cryogenics, Power Converters and other critical systems are using WorldFIP for the exchange of data between their sensors and actuators and the control and supervision level. There are more than 10.000 WorldFIP agents installed all around the LHC tunnel and exposed to a complex radiation field. Recently, the main provider of the WorldFIP agent chipset decided to terminate its support. Moreover the latest version of the chipset was proven to be less radiation tolerant than the previous one. Therefore, a new WorldFIP agent called nanoFIP, has been developed at CERN in cooperation with the industry. nanoFIP is implemented in an Actel ProASIC3 FPGA and it is part of the Open Hardware developments. The paper describes the project's strategy towards radiation tolerance and the results of the radiation testing of the nanoFIP chip with a 230 MeV proton beam at the PSI facility.

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