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ARAMIS: Advanced Real-time Architectures of Data processing, Pattern Recognition and Data Transmission for Frontier Applications in High Energy Physics, High Reliability Systems and Visual Science.

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The ARAMIS project proposes a multi-disciplinary development of new real-time event selection architectures, in view of experiments at high luminosity colliders, such as HL-LHC and SuperB.
The research program includes the development of novel approaches to real-time analysis:
the design of new, extremely fast hardware processors: a mesh of Associative Memories and high speed serial links;
the use of latest-generation Graphical Processing Units (GPU) in timing critical computing tasks;
the development of new moderation techniques and fault-tolerant architectures capable to operate FPGAs safely under radiation.
The project, which requires the highest competence in various fields, is the joint effort of Italian and Foreign Universities and Research Centres. Such collaboration allows ARAMIS to approach any subject of the program with expertise, methods, technologies and research structures at the state of the art.
The developed tools will be specialized for the ATLAS, CMS, LHCb experiments and for application to the SuperB collider. The ultimate goals are to demonstrate the validity of the implemented techniques and to share common resources among experimental physicists in the coming years.
ARAMIS is also meant to go beyond HEP. Strong similarities between advanced Real-Time analysis techniques and the psyco-physiology of the human vision mechanisms have recently emerged. A close collaboration between experts in the two fields will bring to new developments in both areas.

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