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The On-Site Analysis of the Cherenkov Telescope Array

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The Cherenkov Telescope Array (CTA) observatory will be one of the largest ground-based very-high-energy gamma-ray observatories.

The on-site analysis will perform a first CTA scientific analysis of data acquired from the array of telescopes, in both northern and southern sites. The On-Site Analysis has two pipelines: the Level-A pipeline (also known as Real-Time Analysis, RTA) and the level-B one. The RTA performs a data quality monitoring and must be able of issuing automated alerts on variable and transient astrophysical sources within 30 seconds from the last acquired Cherenkov event that contributes to the alert, with a sensitivity not worst than the final one by more than a factor of 3. The Level-B Analysis has a better sensitivity (not be worse by a factor of 2) and should start within 10 hours from the acquisition of the data: for this reason this analysis could be performed at the end of an observation or next morning.

The latency (in particular for the RTA) and the sensitivity requirements are challenging because of the large data rate, a few GByte/s. The remote connection to the CTA candidate site with a rather limited network bandwidth makes the issue of the exported data size extremely critical and prevents any kind of processing in real-time of the data outside the site of the telescopes. For these reasons the analysis will be performed on-site with infrastructures co-located with the telescopes, with limited electrical power availability and with a reduced possibility of human intervention. This means that the on-site hardware infrastructure should have low-power consumption. A substantial effort toward the optimization of high-throughput computing service is envisioned to provide hardware and software solutions with high-throughput, low-power consumption and at low-cost.

This contribution provides a summary of the design of the on-site analysis and reports some prototyping activities.

Collaboration

CTA

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Author: BULGARELLI, Andrea (INAF)

Co-authors: DE ROSA, Adriano (INAF/IASF Bologna); CAROSI, Alessandro (INAF-ASDC); TACCHINI, Alessandro (INAF/IASF Bologna); ABOUDAN, Alessio (INAF/IASF Bologna); WEINSTEIN, Amanda (Iowa State University); ZOLI, Andrea (INAF); HUMENSKY, Brian (University of Chicago); BOISSON, Catherine (Observatoire de Paris, LUTH, CNRS, Université Paris Diderot, France); Dr BASTIERI, Denis (Università di Padova); BENEVENTANO, Domenico (University of Modena and Reggio Emilia, Department of Engineering “Enzo Ferrari”, Strada

Vignolese 905 - 41125 Modena (Italy)); TORRESI, Eleonora (INAF/IASF Bologna); LYARD, Etienne (University of Geneva); SCHÜSSLER, Fabian (CEA); GIANOTTI, Fulvio (INAF); MAIER, Gernot (Deutsches Elektronen-Synchrotron, Platanenallee 6, Zeuthen, Germany); TOSTI, Gino (Università di Perugia, Italy); DE CESARE, Giovanni (INAF/IASF Bologna); LAMANNA, Giovanni (Centre National de la Recherche Scientifique (FR)); MALAGUTI, Giuseppe (INAF/IASF Bologna); OYA, Igor (DESY Zeuthen); JACQUEMIER, Jean (Laboratoire d'Annecy-le-Vieux de Physique des Particules (LAPP)); BORKOWSKI, Jerzy (Copernicus Astronomical Center, Polish Academy of Sciences, Poland); HINTON, Jim (University of Leicester); DUMM, Jon (IceCube); RODRÍGUEZ-VÁZQUEZ, Juan José (Centro de Investigaciones Energéticas, Medioambientales y Tecnologicas, Madrid, Spain); OSBORNE, Julian (Dept. of Physics and Astronomy, University of Leicester, United Kingdom); KNODLSEDER, Jurgen (CESR); KOSACK, Karl (CEA Saclay); NICASTRO, Luciano (INAF/IASF Bologna); ANTONELLI, Lucio Angelo (INAF); FORTSON, Lucy (Univ. + INFN Roma 1); RIBO, Marc (Universitat de Barcelona, Institut de Ci\'ences del Cosmos, IEEC-UB, Barcelona, Spain); MARISALDI, Martino (INAF/IASF Bologna); FUESSLING, Matthias (Institut fr Physik und Astronomie, Universität Potsdam, Karl-Liebknecht-Strasse 24/25, D 14476 Potsdam, Germany); NEYROUD, Nadine (LAPP/CNRS); GRANDI, Paola (INAF/IASF Bologna, Italy); COLOMÉ, Pep (Institut de Ciències de l'Espai (ICE-CSIC) & Institut d'Estudis Espacials de Catalunya (IEEC), Spain); Dr WEGNER, Peter (DESY); EVANS, Phil (Dept. of Physics and Astronomy, University of Leicester, United Kingdom); DE LOS REYES, Raquel (Max-Planck--Institut für Kernphysik, P.O. Box 103980, D 69029 Heidelberg, Germany); GRACIANI DIAZ, Ricardo (University of Barcelona (ES)); LINDEMANN, Rico (Deutsches Elektronen-Synchrotron (DESY), Platanenallee 6, D-15738 Zeuthen, Germany); BUSON, Sara (Dipartimento di Fisica, Università degli Studi di Padova, Italy); LOMBARDI, Saverio (INAF); MARKOFF, Sera (University of Amsterdam); ROSEN, Simon (Dept. of Physics and Astronomy, University of Leicester, United Kingdom); BERGAMASCHI, Sonia (University of Modena and Reggio Emilia, Department of Engineering "Enzo Ferrari", Strada Vignolese 905 - 41125 Modena (Italy)); OHM, Stefan (DESY); INOUE, Susumu (Institute for Cosmic Ray Research, University of Tokyo); LE FLOUR, Thierry (Laboratoire d'Annecy-le-Vieux de Physique des Particules, Université de Savoie, CNRS/IN2P3, France); FIORETTI, Valentina (INAF/IASF Bologna); TESTA, Vincenzo (INAF - Osservatorio Astronomico di Roma, Italy); CONFORTI, Vito (INAF IASF Bologna)

Presenter: SCHÜSSLER, Fabian (CEA)

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