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Presentation of the workshop ACAT

"Advanced Computing and Analysis techniques for Physics Research"

The ACAT workshop series is dedicated to the development of *computing techniques and tools* targeting *basic science research*, and in particular, in *physics*.

The Workshop series started back in 1990 in Lyon (France) under the different acronym of **AIHENP** standing for *Artificial Intelligence in High Energy and Nuclear Physics*. It was set to discuss the benefits recent advances in computing sciences in *"Artificial Intelligence"* could bring to this research field. More precisely, the question raised was "How computers can achieve tasks occurring in research going beyond mere numerical computations ?"

In the second session (1992 in La Londe Les Maures, France), one of the very first presentations of the *World Wide Web*_ project before a wide and international audience was given by Tim Berners-Lee. But the workshop series helped many other ideas to emerge in _event filtering (neural nets and genetic algorithm), in *user graphic interfaces*, in *data analysis* or *automated cross-section computations*.

The workshops organized every 18 months were held then successively in Oberammergau (Germany), Pisa (Italy), Lausanne (Switzerland), Heraklion (Greece), Batavia (USA), Moscow (Russia), Tsukuba (Japan), Zeuthen (Germany), Amsterdam (The Netherlands), Erice (italie), Jaipur (India), Uxbridge(UK), Beijing (China), Prague (Czech Rep.), Valparaison (Chile) (see on Inspire the full list) Since the US event, the series switched its acronym to **ACAT** to emphasis the growing importance of tools and infrastructures for data analysis and to open its scope to a wider field of applications.

Proceedings have been published by the CNRS editions, World Scientific, Elsevier Nuclear Instruments and Methods A, AIP Conference proceedings, Proceedings of Science and IOP

Organizing formal and informal **discussions** is the main **raison d'être** of the workshop. Back in 1990, it was important to gather people working in similar or related fields, but having no easy means to exchange and confront ideas and results. Nowadays, researchers often clustered in large experiments have little opportunities to meet their colleagues in other big experiments. The workshop series is meant to overcome both pitfalls for the sake of a more efficient research.

The "Computing in Physics" blog covers all the topics discussed in ACAT and more. Feel free to contribute.

Main topics

The **ACAT** scientific programme includes the following topics

Track 1: Computing Technology for Physics Research

1. Languages, Software quality, IDE and User Interfaces
    - ♦ Languages (new C++ standard, Java, ...), Code Portability: using templates, toward Compiler
    - ♦ Software quality assurance; code reflection; documentation, performance and debugging tools
    - ♦ Computer system Benchmarking, beyond LinpackComputer system Benchmarking, beyond Linpack
    - ♦ IDE and frameworks
    - ♦ User Interfaces, Common Libraries.
2. Distributed and Parallel Computing

- Multilevel parallelism
- Distributed computing
- GRID and Cloud computing

3. New architectures, many and multi-cores
   - Many-core
   - accelerator-based computing (GPU, etc)
   - High precision computing (hardware)
4. Virtualisation
5. Online computing
   - Advanced Monitoring, Diagnostics and Control
   - Scalable distributed data collectors
   - High Level Triggering (HLT)
   - Stream event processing & High Throughput Computing (HTC)

Track 2: Data Analysis - Algorithms and Tools

1. Machine Learning
   - Neural Networks and Other Pattern Recognition Techniques
   - Evolutionary and Genetic Algorithms, Multi-variate analysis
   - Package Benchmarking
   - Automation of Science: Data to formula
2. Advanced Data Analysis Environments
   - Statistical Methods, Multivariate analysis
   - Data mining
3. Simulation, Reconstruction and Visualisation Techniques
   - Detector and Accelerator Simulations, MC and fast MC
   - Reconstruction Algorithms
   - Visualization Techniques; event displays
4. Advanced Computing
   - Quantum Computing
   - Bio Computing: life process simulation, brain simulation, Quantum biology

Track 3: Computations in Theoretical Physics: Techniques and Methods

1. Automatic Systems
   - Automatic Computation Systems: from Processes to Event Generators
   - Multi-dimensional Integration and Event Generators
   - Intensive High Precision Numerical Computations: Algorithms and Systems
2. Higher orders
   - One-loop event generators
   - Multi-loop Calculations and Higher Order Corrections
3. Computer Algebra Techniques and Applications
4. Computational physics, Theoretical and simulation aspects
   - Lattice QCD,
   - Cosmology, Universe Large Scale Structure, Gravitational waves
   - Nuclear physics N-body computation,
   - Plasma physics,
   - Earth Physics, climate, earthquakes

-- DenisPerretGallix - 2016-05-12

-- DenisPerretGallix - 10 Oct 2007

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