

# The ZEN Project

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Evidence for the accelerated expansion of the Universe has been observed in the last decade with the many cosmological observations. The origin of accelerated expansion remains one of the most challenging research activities today. Progress in this field requires both theoretical innovations and many accurate observational probes with controlled systematic error estimates. The difficulty in performing combinations of different observations is to manage in a global analysis a large number of cosmological and astrophysical parameters (14 or more). As correlations are large and cannot be ignored at the percent accuracy level, the statistical method and the construction of an efficient numerical tool represent an important step of the ZEN project. We promote a frequentist approach which is commonly used by the High Energy Physics community and well under control. Our results are in agreement with complementary methods (mainly Bayesian using Monte Carlo Markoff chain).

## 3. Impact

The framework has already been developed and we adapt it within the Grid facility. This tool allows us to analyse new data in a coherent way very rapidly and intensely and is very useful for the design of future projects and the optimization of their strategies. The expected new data from various probes will be added into this framework, which will probably give us new interesting results for the cosmology. First attempts to introduce cosmological analysis based on frequentist statistical method on Grid have been successfully performed. Future experimental results will probably help us to understand better the nature of dark energy.

## 4. Conclusions / Future plans

ZEN needs a large number of CPUs, more than 1500 each run, but few storage. ZEN is running actually in the ESR VO, in parallel we are invited by INFN to install ZEN in the EUChina VO, in collaboration with Peking University and IHEP in Beijing. All major technical problems have been solved but still more developments are needed. Our first scientific results clearly show the power of EGEE in such analysis.

## Provide a set of generic keywords that define your contribution (e.g. Data Management, Workflows, High Energy Physics)

Cosmology, Dark energy, EGEE, Euchina

## 1. Short overview

The ZEN project, on the Universe expansion, is to provide a consistent and complete phenomenological framework bringing together theoreticians, phenomenologists and experimentalists. This framework handles theories, observed data, and statistical tools based on a phenomenological approach in order to allow a consistent interpretation of the free parameters, and the inclusion of experimental systematic errors. A new method, based on a frequentist approach, has been developed and ported on EGEE.

**Author:** Dr TILQUIN, André (CPPM/IN2P3)

**Presenter:** Dr TILQUIN, André (CPPM/IN2P3)

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