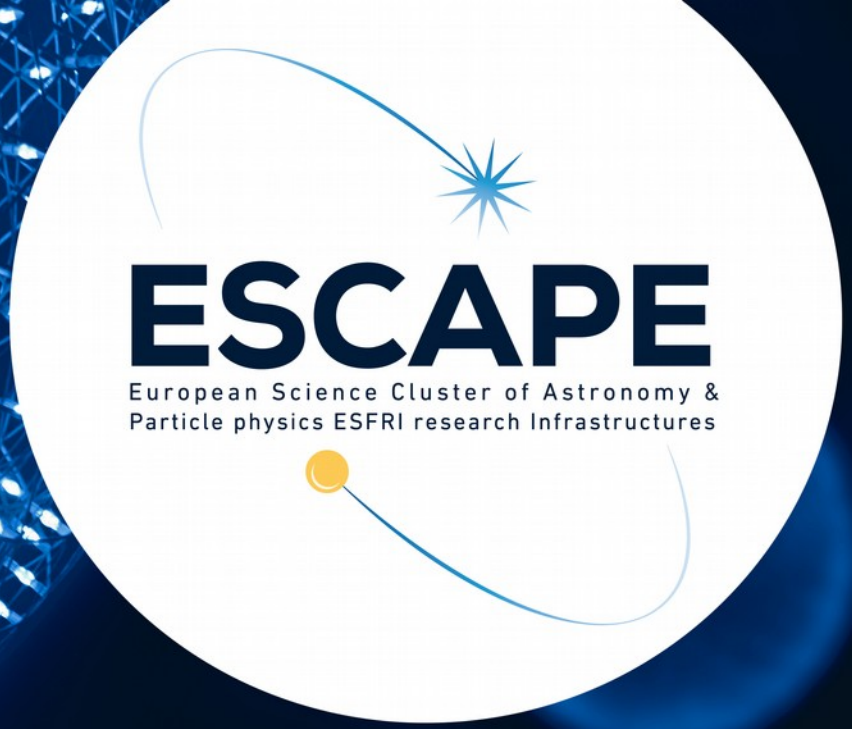

KM3NeT and DIRAC Use case

Cristiano Bozza - UNISA & INFN - 27/10/2020

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KM3NeT and DIRAC – Use case

- KM3NeT currently using the GRID + local institutional clusters (CC-IN2P3, INFN/CNAF, ReCaS, NCBJ,…)
- Interest in using DIRAC
  - Job submission/management and development
  - Integrate script and GUI access
- Exploring usage of DIRAC: simulation of primary cosmic ray interactions
  - Using CORSIKA (supported and validated tool)
  - Containerized approach: solve SW compatibility issues
  - Turnkey containers – require minimal user interaction
  - Must be easy to use!

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KM3NeT and DIRAC – Use case

- Technical implementation: shown by Luigi Fusco and Andrei Tsaregorodtsev

- KM3NeT goal for CORSIKA simulations
  - Optimizing the matching of simulations to data being collected by detector
    - Energy dependence of the shower profile
    - Particle content of air showers, muon bundles, etc.

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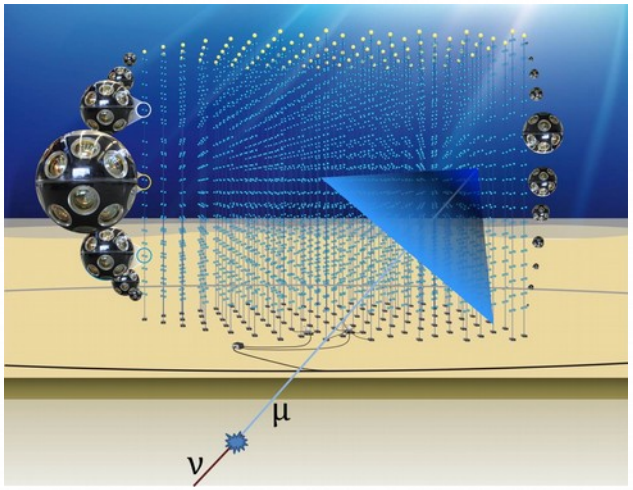
KM3NeT and DIRAC – Use case

- Who are the targeted users?
  - Air shower studies (also beyond KM3NeT)
  - KM3NeT: assessment of detector performances
    - Detailed shower profile
    - Propagate particles through water
    - Obtain Cherenkov radiation in water towards detector
    - Simulate photon counts (hits) in the detector Depends on the particles, direction and energy produced
    - Corsika used for cross-checks and tuning



  - KM3NeT: computation of Instrument Response Function of the detector
    - Mostly the *Effective Area*
    - Repeatedly run simulations: detector is being incrementally built

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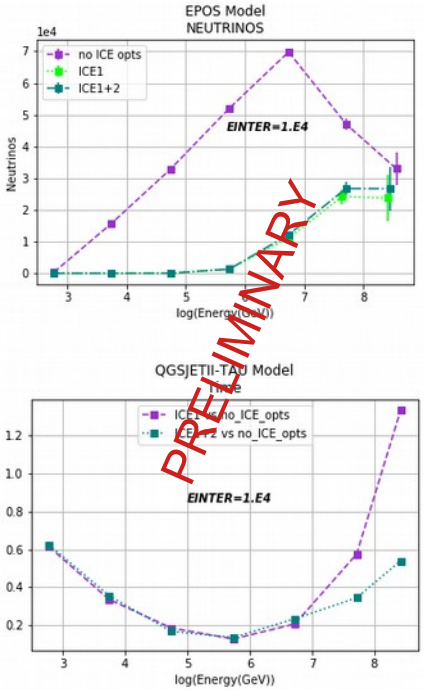
KM3NeT and DIRAC – Use case

- What resources are to be used?
  - **Con**tainers for **COR**SIKA on **DIR**A**C**
    - Produced in E-OSSR Task 3.3
    - Physics output qualified and assessed
    - Performances benchmarked
  - GUI for container creation
    - Tune the simulation parameters according to needs
    - Check available resources at a glance (avoid work duplication)
  - Data: CORSIKA setup and runcards
  - Data: CORSIKA output
    - Make output retrieval easy for re-injection to next stages of simultion chain
    - Possibly have the full chain in DIRAC?
    - Data storage management in DIRAC
      - Evaluate time and cost for production/storage/retrieval



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KM3NeT and DIRAC – Use case

- Workflow
  - 1 Picking an existing container template
  - 2 (optional) Modifying it and generating a new container
  - 3 Choosing a DIRAC installation to provide data production
  - 4 Choosing a (temporary) output storage (DIRAC/RUCIO?)
  - 5 Running the simulation - monitoring by GUI
  - 6 Retrieving the data from DIRAC storage or RUCIO
  - 7 Feeding output to:
    - 7.a external storage for analysis or further processing
    - 7.b DIRAC/RUCIO storage
    - 7.c immediate transfer to input stage of other user application

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