



**WP1  
casacore**

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ASTRON is part of the Netherlands Organisation for Scientific Research (NWO)

1. Prototypes for optimized Casacore software and data formats
2. Prototypes for optimized Casacore algorithms
3. Demonstrate on various clusters  
DAS-4, Oxford OSC, SMP-cluster, GPU-based cluster

ALMA/EVLA online system writes data in ASDM data format

Table System's Data Managers map logical table columns to physical data format

ASDM dataset can appear as a MeasurementSet

Random access is required

AsdmStMan maps some MeasurementSet columns to/from ASDM

- Special storage manager for ASDM
  - shared library automatically loaded by casacore Table System
- Access bulk data directly in ASDM files instead of making a copy
  - Saves factor 30 in size of MeasurementSet
  - In principle get and put are possible
- ASDM is a sequential format; *importadsm* creates a (small) index file
- Tests showed 15% speed-up in running the entire data processing pipeline
  - Mostly *importasdm* and
  - Also gains in *applycal* (because ASDM uses 16 bit integers -> less I/O)
- Caillat (Observatoire de Paris), Petry, van Diepen

## Casacore allows for any storage manager

Andre Offringa (Canberra) developed compressing storage manager

- Compression based on data statistics
- 4-fold compression
- Lossy, but final image hardly changed
- More tests needed making it public
- Writing paper about it

Shows extensibility of casacore

- Improved thread-safety
  - Especially measures
- Support for ephemeris in MeasurementSet Field subtable (Petry)
  - Comets, moons in ALMA
  - Enabling MSConcat to handle ephemerides
- Arbitrary attributes in images
  - For archive meta data purpose
- Image support for frequency/stokes dependent beams (NRAO)
- FITS Import/export improvements (Petry)
- Parallelized table sort
  - Takes advantage of multi-core systems
  - Uses OpenMP
  - Recognizes if data is already in correct order (or in reversed order)

- Additions to TaQL (Table Query Language)
  - Masked arrays (almost finished)  
E.g. mean of all channels for each polarization  
`select means(DATA[FLAG], 0) from ms`
  - Multiple tables possible  
E.g., for regression testing:  
`select from ms1, ms2 where not all(near(ms1.DATA, ms2.DATA))`
  - User Defined Functions (loaded as shared library)
    - Handling of measures (coordinates)  
`meas.galactic (-6h52m36.7, 34d25m56.1, "J2000")`  
`meas.azel ("SUN", datetime(), "WSRT")`
    - Specialized MeasurementSet/CalTable functions
      - hadec, uvw, etc.
      - CASA selection syntax  
`mscal.baseline('CS*')`

- Discussion on 25-26 April
  - ATNF, NRAO, ESO, ASTRON
  
- Topics
  - More use of STL and Boost
    - Remove casacore's pre-STL classes like Map, List
  - Improved thread-safety and thread support
  - Parallelization of some more algorithms
  - Virtual Observatory
  - Release management

Thank you