CASA & the Measurement Set (MS)

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Session objectives

1. What is CASA?
2. Inspecting & plotting with CASA
3. The measurement set format

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CASA

- Common Astronomy Software Applications
- Developed by a consortium (NRAO, ESO, NAOJ, CSIRO, and ASTRON)
- Aimed at ALMA and VLA but works for other telescopes too

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- Homepage: `http://casa.nrao.edu`
- Documentation: `https://casa.nrao.edu/casadocs`
- Tutorials: `https://casaguides.nrao.edu`

- Latest version: v5.3.0
- We will use version v4.7.2 during this workshop

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- Start CASA by typing **casa** in the command prompt.

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Go to EVN continuum tutorial

Finding help in CASA

- **tasklist** - to get a list of available tasks.

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- **help** <**taskname**> - Detailed help for the specified task.

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Finding help in CASA

- **tasklist** - to get a list of available tasks.
- **taskhelp** - A one-line explanation of all available tasks.
- **help** <**taskname**> - Detailed help for the specified task.
- **inp** <**taskname**> - List parameters for a given task.

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Measurement sets

- Measurement set (or MS) is a native casacore format
- You can think of MS as a collection of tables

	ANT 1	ANT 2	UVW	DATA	CORRECTED_DATA	FLAG
Row 1						
Row 2						
Row 3						
...						
Row N						

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- Each row corresponds to a unique **Time** and **Baseline**
- Recall that a **Baseline** is a correlation between two antennas.

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- Each row corresponds to a unique **Time** and **Baseline**
- Recall that a **Baseline** is a correlation between two antennas.
- There are more columns than what is shown here. We will see them later using a tool called **casabrowser**.
- In addition to this MAIN table, an MS also has many sub-tables.

Demonstration with casabrowser

Flags and bad data

- What do you do when you know a data point (or a row) is bad?
- Should we just delete that row?

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Flags and bad data

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- Should we just delete that row?
- No, we "flag" them as bad.

	ANT 1	ANT 2	UVW	DATA	CORRECTED_DATA	FLAG
Row 1						0
Row 2						0
Row 3						0
...						...
Row N						0

Flags and bad data

- What do you do when you know a data point (or a row) is bad?
- Should we just delete that row?
- No, we "flag" them as bad.

	ANT 1	ANT 2	UVW	DATA	CORRECTED_DATA	FLAG
Row 1						0
Row 2						0
Row 3						1
...						...
Row N						0

- Note, 0 is False and 1 is True

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Physical & logical structure of MS

- From the terminal, an MS looks just like a directory
- Type **ls** <**ms name**>. Do you see the table with row and columns?

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Physical & logical structure of MS

- From the terminal, an MS looks just like a directory
- Type **ls <ms name>**. Do you see the table with row and columns?
- No, what you see is the physical structure of the MS.
- The **physical** and the **logical** structure of the MS are not the same.
  - Physical structure - How the table is stored on disk?
  - Logical structure - The tabular view we see in **casabrowser**.
  - The MAIN table is physically stored in the **table.*** files.

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