Advanced Astronomical Observations 2021
Session 13: Basic CCD Data Reduction 2

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publicly accessible version

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  - Contact address: `https://www.instagram.com/daisuke23888/`

We do CCD data reduction for upcoming sessions.

1 Downloading data

Download a set of data.

```
% curl -k -o data_ao2021_s13.tar.xz \
? https://s3b.astro.ncu.edu.tw/advobs_202102/data/data_ao2021_s13.tar.xz
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 1645M  100 1645M    0     0  3254k      0  0:08:37  0:08:37 --:--:-- 4226k
% ls -l data_ao2021_s13.tar.xz
-rw-r--r--  1 daisuke  taiwan  1725532936 May  5 00:53 data_ao2021_s13.tar.xz
```

2 Extracting data

Extract the data. 534 FITS files are extracted from the tar archive file.

```
% tar xJvf data_ao2021_s13.tar.xz
x data_ao2021_s13/
x data_ao2021_s13/lot_20210214_0085.fits
x data_ao2021_s13/lot_20210214_0086.fits
x data_ao2021_s13/lot_20210214_0087.fits
x data_ao2021_s13/lot_20210214_0088.fits
```

```
x data_ao2021_s13/lot_20210214_0089.fits

.....

x data_ao2021_s13/lot_20210214_0967.fits
x data_ao2021_s13/lot_20210214_0968.fits
x data_ao2021_s13/lot_20210214_0969.fits
x data_ao2021_s13/lot_20210214_0970.fits
x data_ao2021_s13/lot_20210214_0971.fits
% ls -l data_ao2021_s13 | head
total 4306
-rw-r--r--  1 daisuke  taiwan  8398080 Feb 15 00:24 lot_20210214_0085.fits
-rw-r--r--  1 daisuke  taiwan  8398080 Feb 15 00:25 lot_20210214_0086.fits
-rw-r--r--  1 daisuke  taiwan  8398080 Feb 15 00:26 lot_20210214_0087.fits
-rw-r--r--  1 daisuke  taiwan  8398080 Feb 15 00:28 lot_20210214_0088.fits
-rw-r--r--  1 daisuke  taiwan  8398080 Feb 15 00:29 lot_20210214_0089.fits
-rw-r--r--  1 daisuke  taiwan  8400960 Feb 15 00:36 lot_20210214_0093.fits
-rw-r--r--  1 daisuke  taiwan  8400960 Feb 15 00:36 lot_20210214_0094.fits
-rw-r--r--  1 daisuke  taiwan  8400960 Feb 15 00:37 lot_20210214_0095.fits
-rw-r--r--  1 daisuke  taiwan  8400960 Feb 15 00:37 lot_20210214_0096.fits
% ls data_ao2021_s13 | wc
     534     534   12282
```

3 Checking data

Make your own Python script to check whether the data set is self-consistent. Execute the script.

4 Data reduction

Make your own Python script to carry out CCD data reduction. Execute the script.

5 Visual inspection of reduced data

Use Ginga to show dark-subtracted flat-fielded frames for visual inspection.

6 For your training

1. Read chapter 4 of "Handbook of CCD Astronomy" to learn about basic CCD data reduction.
   - Handbook of CCD Astronomy (2nd Edition)
     - Steve B. Howell
     - Cambridge University Press
     - `https://doi.org/10.1017/CBO9780511807909`
2. Read the document "A User's Guide to CCD Reductions with IRAF" and learn about basic CCD data reduction.
   - A User's Guide to CCD Reductions with IRAF
     - Philip Massey
     - `http://iraf.noao.edu/iraf/ftp/docs/ccduser3.ps.Z`
3. Read the document "An Introduction to Astronomical Photometry using CCDs" and learn about basic CCD data reduction.
   - An Introduction to Astronomical Photometry using CCDs
     - William Romanishin
     - `http://hildaandtrojanasteroids.net/wrccd22oct06.pdf`

7 Assignment

No assignment for this session.