# Computer Exercise 2 OAF2

## Power spectra

Copy the file reeks.data at:
/home/strknd/pjonker/OPENoaf2-comp-exercises/reeks.data
to your location of choise.

The file contains 65536 measurements (16 on each row). It represents simulated X–ray data of an X–ray binary. Each number represents the number of X–ray photons detected in 1 millisecond. The data is continuous.
a. write a little computer program which reads and writes to the screen the first 8 numbers from this list.
b. now use the routine $\texttt{realft}(data, n, isign)$ from Numerical Recipes to compute the Fourier transform of these 8 points.
As input, the routine $\texttt{realft}$ requires an array $data$ with the data points, the integer $n$ which gives the number of data points, and the integer $isign$ which tells it whether to perform a forward or a backward Fourier transformation. As output it gives $data(1)$ as the total number of photons, which equals $a_0$, $data(2)$ is $a_{n/2}$, and for the remaining components of the transform we have $data(2j + 1) = Re\{a_j\}$ and $data(2j + 2) = Im\{a_i\}$.
c. Now compute the Fourier transform of the whole data set, and compute and plot the power spectrum.
d. We want to see whether the highest peak observed in the power spectrum is significant. To do this, determine the detection level of 90% and 99% probability. Take account of the number of trials!
e. Reduce the noise in the power spectrum by averaging in bins of 16 powers. Do you note new features?