mcmc_fit_with_outliers

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1 Fitting a line to data using MCMC

In this example we will be going over Exercise 6 from Hogg 2010. We will be fitting a line to data using a model that rejects outliers using an MCMC sampler.

1.1 Packages being used

- `numpy`: doing math on arrays
- `scipy`: more useful functions here
- `emcee`: this does the heavy lifting for the MCMC code
- `matplotlib`: plot our results
- `astropy`: useful hist function

1.2 Relevant documentation

- `scipy`: http://docs.scipy.org/doc/scipy/reference/generated/scipy.misc.logsumexp.html
- `emcee`: http://dan.iel.fm/emcee/current/
- `matplotlib`: http://matplotlib.org/2.0.2/api/pyplot_summary.html
- `astropy`: http://docs.astropy.org/en/stable/visualization/histogram.html

```
In [1]: import numpy as np
        from scipy.special import logsumexp
        from matplotlib import pyplot as plt
        import emcee
        from astropy.visualization import hist
        from astropy.table import Table
        import mpl_style
        %matplotlib inline
        plt.style.use(mpl_style.style1)
```

1.2.1 Read in the data

First lets read in the data we will be fitting (`.data` returns the raw data array):

```
In [2]: data = Table.read('data.csv', format='ascii.csv')
        x = data['x'].data
        y = data['y'].data
        sy = data['sy'].data
```

1.2.2 Plot the data

Lets take a look at our data to see what we are fitting:

```
In [3]: plt.figure(1)
        plt.errorbar(
            x,
            y,
            sy,
            ls='None',
            mfc='k',
            mec='k',
            ms=5,
            marker='s',
            ecolor='k'
        )
        plt.xlabel('x')
        plt.ylabel('y')
        plt.ylim(0, 700)
```

```
Out[3]: (0, 700)
```