pylab5

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0.1 PyLab 5

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```python
[1]: import numpy as np
     import matplotlib.pyplot as plt
     %matplotlib inline
     import scipy.stats as stats
     import seaborn as sns
```

```python
[2]: sampleid, background = np.loadtxt('background.txt', delimiter='\t', skiprows=2,␣
     ↪unpack=True)
     _, plate = np.loadtxt('plate.txt', delimiter='\t', skiprows=2, unpack=True)

     sampleid *= 20
     clean = plate - background.mean()
```

```python
[3]: X = stats.poisson(clean.mean())
     Z = stats.norm(clean.mean(), np.sqrt(clean.mean()))
```

```python
[16]: print(f'mean of plate: {plate.mean():.2f} counts/s')
      print(f'mean of background: {background.mean():.2f} counts/s')
      print(f'mean of data, with the background mean subtracted: {clean.mean():.2f}␣
      ↪counts/s')
```

```
mean of plate: 52.12 counts/s
mean of background: 0.61 counts/s
mean of data, with the background mean subtracted: 51.51 counts/s
```

```python
[5]: plt.hist(clean, density=1, label='Data')
     plt.plot(X.pmf(np.arange(100)), label='Poisson fit')
     plt.plot(Z.pdf(np.arange(100)), label='Gaussian fit')
     plt.title('Poisson and Gaussian fits to data')
     plt.legend()
     plt.xlabel('Rate (count/s)')
     plt.ylabel('Probability')
```

```
plt.savefig('data_plot.png')
```

Poisson and Gaussian fits to data
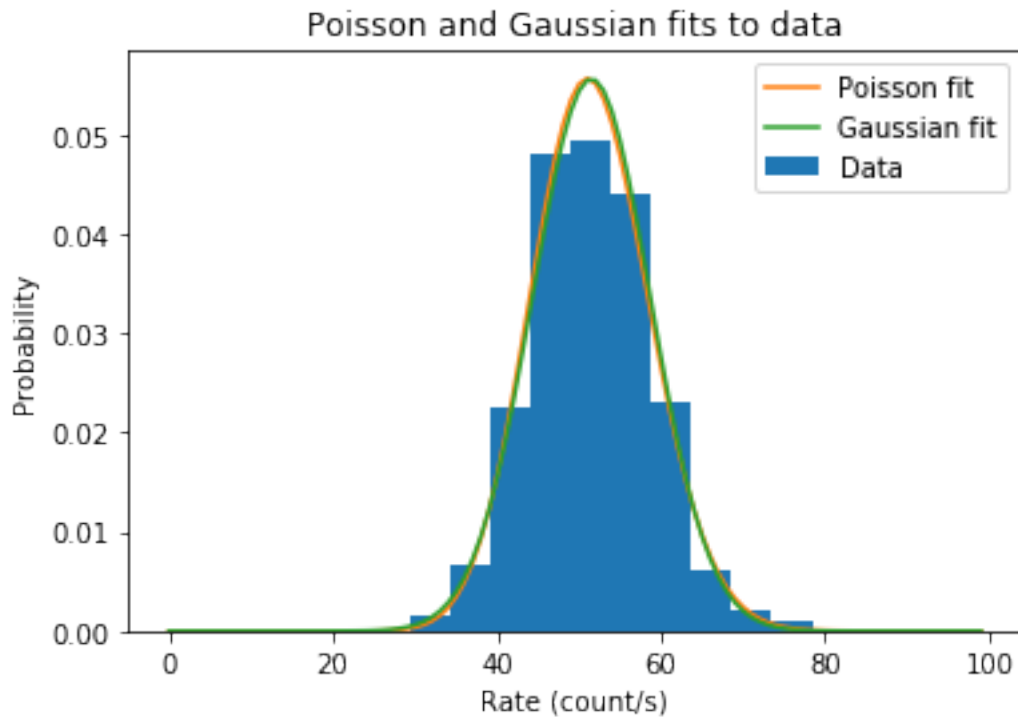

```
[6]: X2 = stats.poisson(background.mean())
     Z2 = stats.norm(background.mean(), np.sqrt(background.mean()))
```

```
[7]: count, edges, patches = plt.hist(background, density=1, bins=5, label='Data')
     mid = 0.5 * (edges[:-1] + edges[1:])
     plt.plot(mid, X2.pmf(edges[:-1]), label='Poisson fit')
     plt.plot(mid, Z2.pdf(edges[:-1]), label='Gaussian  fit')
     plt.title('Poisson and Gaussian fits to background')
     plt.legend()
     plt.xlabel('Rate (count/s)')
     plt.ylabel('Probability')
     plt.savefig('background_plot.png')
```

Poisson and Gaussian fits to background
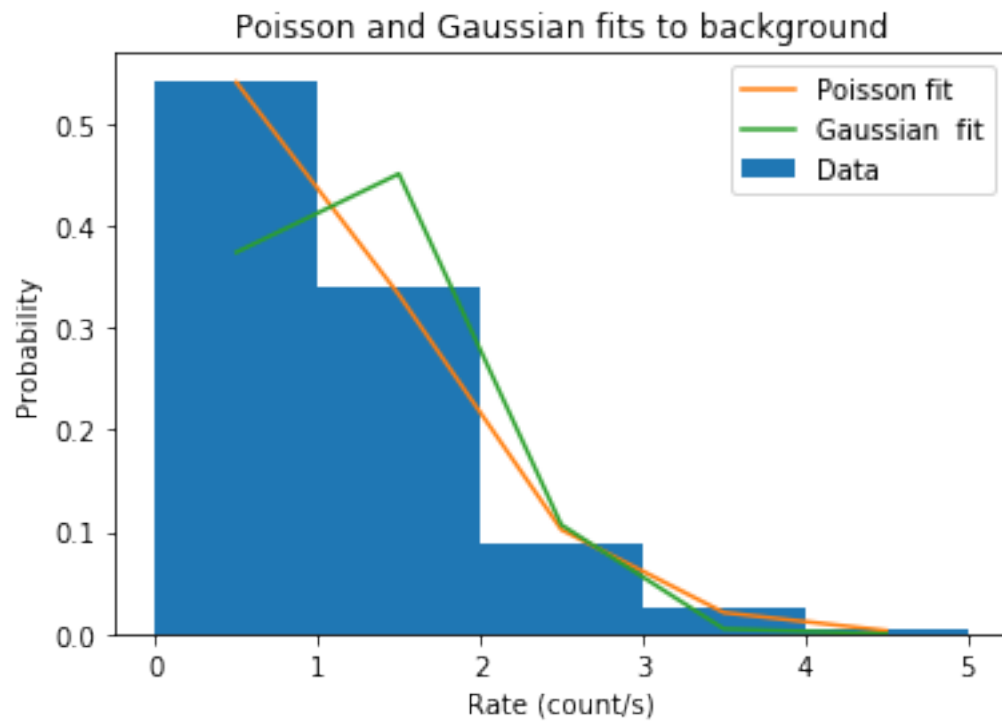
[14]:
```python
err = np.sqrt(np.var(plate) + np.var(background))
print(f'error: {err:.2f} counts/s')
```

error: 7.49 counts/s

[ ]: