cosmic

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```python
[25]: import numpy as np
      import pandas as pd
      import matplotlib.pyplot as plt
      from scipy.interpolate import interp1d
      import warnings

      warnings.filterwarnings("ignore")
```

1 Datas

```python
[26]: # plateau datas
      d1_plateau = pd.read_excel("data.xlsx", sheet_name="pd1")
      d1_voltage = d1_plateau["d1_voltage"]
      d1_counts = d1_plateau["d1_counts"]

      d2_plateau = pd.read_excel("data.xlsx", sheet_name="pd2")
      d2_voltage = d2_plateau["d2_voltage"]
      d2_counts = d2_plateau["d2_counts"]

      d3_plateau = pd.read_excel("data.xlsx", sheet_name="pd3")
      d3_voltage = d3_plateau["d3_voltage"]
      d3_counts = d3_plateau["d3_counts"]
```

2 Functions

```python
[27]: # function for interpolation
      def interpolate(x, y):
          f = interp1d(x, y, kind="quadratic", fill_value="extrapolate")
          a = np.arange(x[0], x[len(x) - 1], 0.001)
          b = f(a)
          return a, b


      # funciton for polynomial fitting
      def polfit(a, b, c):
          z = np.polyfit(a, b, c)
```

```
    f = np.poly1d(z)

    x = np.arange(a[0], a[len(a) - 1], 0.001)
    y = f(x)
    return x, y
```

3 Plateau Curves

3.1 Detector 1

```
[35]: voltage_interpolated_d1, counts_interpolated_d1 = interpolate(d1_voltage,␣
       ↪d1_counts)

      plt.style.use("seaborn-poster")
      plt.figure(figsize=(15, 8))
      plt.title(f"Plateau curve: Detector 1")
      plt.xlabel("channel (V)")
      plt.ylabel("counts per minute")
      plt.plot(voltage_interpolated_d1, counts_interpolated_d1, "--",␣
       ↪label="interpolated points")
      plt.plot(d1_voltage, d1_counts, "o", markersize=8, label="original counts")
      plt.legend(loc="upper left")
      plt.grid(alpha=0.5, which="major")
      plt.minorticks_on()
      plt.grid(alpha=0.3, which="minor", ls="--")
      plt.show()
```
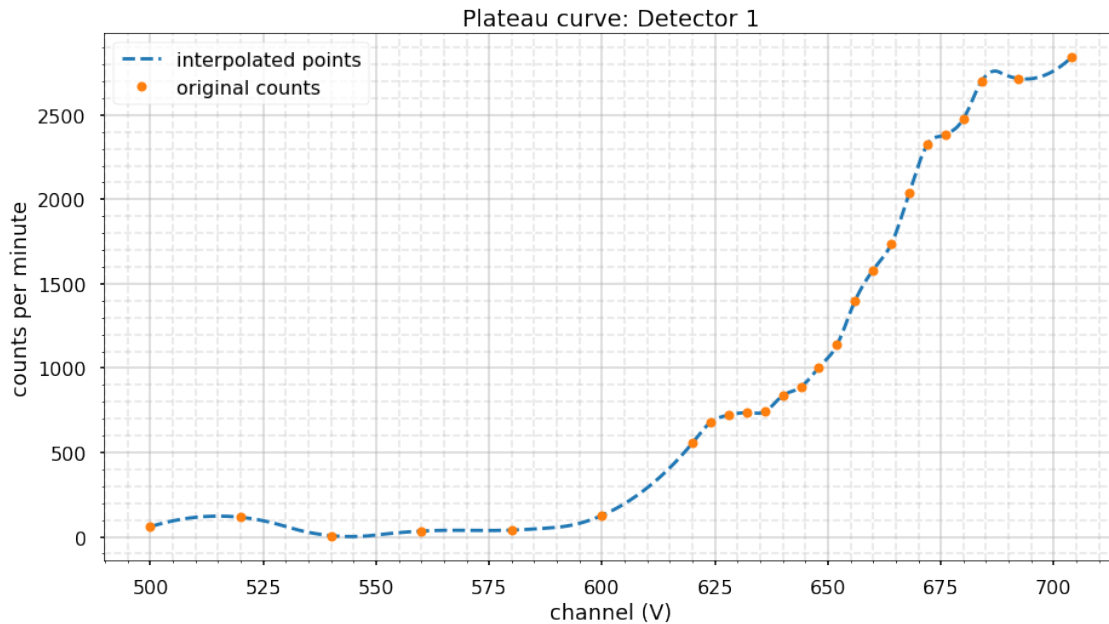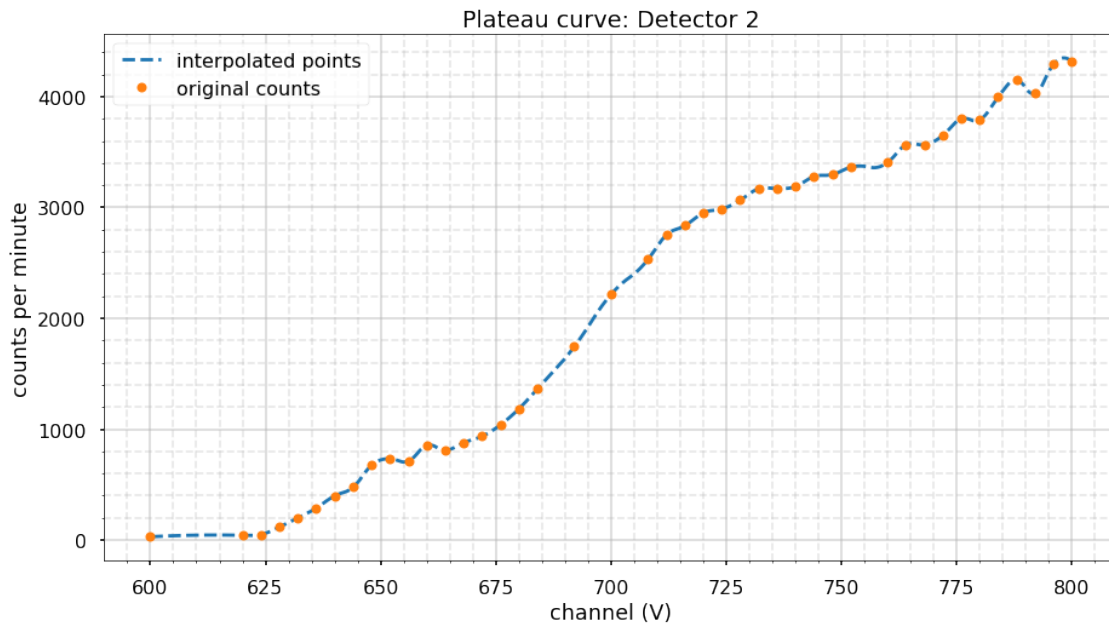
3.2 Detector 2

```
[34]: voltage_interpolated_d2, counts_interpolated_d2 = interpolate(d2_voltage,␣
      →d2_counts)

      plt.style.use("seaborn-poster")
      plt.figure(figsize=(15, 8))
      plt.title(f"Plateau curve: Detector 2")
      plt.xlabel("channel (V)")
      plt.ylabel("counts per minute")
      plt.plot(voltage_interpolated_d2, counts_interpolated_d2, "--",␣
      →label="interpolated points")
      plt.plot(d2_voltage, d2_counts, "o", markersize=8, label="original counts")
      plt.legend(loc="upper left")
      plt.grid(alpha=0.5, which="major")
      plt.minorticks_on()
      plt.grid(alpha=0.3, which="minor", ls="--")
      plt.show()
```


3.3 Detector 3

```
[33]: voltage_interpolated_d3, counts_interpolated_d3 = interpolate(d3_voltage,␣
      →d3_counts)

      plt.style.use("seaborn-poster")
      plt.figure(figsize=(15, 8))
      plt.title(f"Plateau curve: Detector 3")
```

3

```
plt.xlabel("channel (V)")
plt.ylabel("counts per minute")
plt.plot(voltage_interpolated_d3, counts_interpolated_d3, "--",␣
 ↪label="interpolated points")
plt.plot(d3_voltage, d3_counts, "o", markersize=8, label="original counts")
plt.legend(loc="upper left")
plt.grid(alpha=0.5, which="major")
plt.minorticks_on()
plt.grid(alpha=0.3, which="minor", ls="--")
plt.show()
```