

# r7022

898 keV:

■  $\sigma$ :

```
In[156]:=  $\sigma = 0.750375;$ 
```

■  $\mu$ :

```
In[157]:=  $\mu1 = 897.248;$   
 $\mu2 = 897.292;$   
 $\mu3 = 897.481;$   
 $xi = \{\mu1, \mu2, \mu3\};$   
 $\mu = \text{Mean}[\{\mu1, \mu2, \mu3\}]$   
  
 $\text{StandardDeviation}[\{\mu1, \mu2, \mu3\}]$   
 $\text{MeanDeviation}[\{\mu1, \mu2, \mu3\}]$   
 $\frac{\text{Sum}[\text{Abs}[x - \mu], \{x, xi\}]}{3}$ 
```

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Out[161]= 897.3403333
```

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Out[162]= 0.1237914914
```

```
Out[163]= 0.09377777778
```

```
Out[164]= 0.09377777778
```

■ Background Area:

$\sigma$

```
In[165]:=  $\text{b1} = \text{Integrate}[-8.85816 * 10^{-6} * x + 0.0603580, \{x, \mu - \sigma, \mu + \sigma\}]$ 
```

```
Out[165]= 0.07865313054
```

$2\sigma$

In[166]:= **b2 = Integrate**  $[-8.85816 * 10^{-6} * x + 0.0603580, \{x, \mu - (2 * \sigma), \mu + (2 * \sigma)\}]$

Out[166]= 0.1573062611

$3\sigma$

In[167]:= **b3 = Integrate**  $[-8.85816 * 10^{-6} * x + 0.0603580, \{x, \mu - (3 * \sigma), \mu + (3 * \sigma)\}]$

Out[167]= 0.2359593916

$4\sigma$

In[168]:= **b4 = Integrate**  $[-8.85816 * 10^{-6} * x + 0.0603580, \{x, \mu - (4 * \sigma), \mu + (4 * \sigma)\}]$

Out[168]= 0.3146125222

In[169]:= **b = Mean**  $\{b2, b3, b4\}$   
**db = MeanDeviation**  $\{b2, b3, b4\}$

Out[169]= 0.2359593916

Out[170]= 0.05243542036

#### ■ Signal Area:

In[171]:= **A = 1.015;**

$\sigma$

In[172]:= **s1 =**  $\frac{A}{\sigma * \sqrt{2 * \pi}} * \text{Integrate} \left[ \text{Exp} \left[ -\frac{1}{2} \left( \frac{x - \mu}{\sigma} \right)^2 \right], \{x, \mu - \sigma, \mu + \sigma\} \right]$

Out[172]= 0.6929298335

$2\sigma$

In[173]:= **s2 =**  $\frac{A}{\sigma * \sqrt{2 * \pi}} * \text{Integrate} \left[ \text{Exp} \left[ -\frac{1}{2} \left( \frac{x - \mu}{\sigma} \right)^2 \right], \{x, \mu - (2 * \sigma), \mu + (2 * \sigma)\} \right]$

Out[173]= 0.9688172317

3 $\sigma$

```
In[174]:= s3 =
  
$$\frac{A}{\sigma \sqrt{2 \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - (3 * \sigma), \mu + (3 * \sigma)\}\right]$$

```

```
Out[174]= 1.012259707
```

4 $\sigma$

```
In[175]:= s4 =
  
$$\frac{A}{\sigma \sqrt{2 \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - (4 * \sigma), \mu + (4 * \sigma)\}\right]$$

```

```
Out[175]= 1.014935707
```

```
In[176]:= s = Mean[{s2, s3, s4}]
ds = MeanDeviation[{s2, s3, s4}]
```

```
Out[176]= 0.998670882
```

```
Out[177]= 0.01990243353
```

#### ■ SN Ratio

```
In[178]:= s / b
```

```
Out[178]= 4.232384544
```

1836.1 keV:

# r7023

898 keV:

#### ■ $\sigma$ :

```
In[179]:=  $\sigma = 1.00907;$ 
```

$\mu$ :

```
In[180]:=  $\mu_1 = 896.911;$ 
 $\mu_2 = 896.904;$ 
 $\mu_3 = 896.893;$ 
 $\mathbf{x_i} = \{\mu_1, \mu_2, \mu_3\};$ 
 $\mu = \text{Mean}[\{\mu_1, \mu_2, \mu_3\}]$ 
 $\text{StandardDeviation}[\{\mu_1, \mu_2, \mu_3\}]$ 

 $\text{MeanDeviation}[\{\mu_1, \mu_2, \mu_3\}]$ 
 $\frac{\text{Sum}[\text{Abs}[\mathbf{x} - \mu], \{\mathbf{x}, \mathbf{x_i}\}]}{3}$ 
```

Out[184]= 896.9026667

Out[185]= 0.009073771726

Out[186]= 0.006444444444

Out[187]= 0.006444444444

#### ■ Background Area:

 $\sigma$ 

```
In[188]:=  $\mathbf{b1} =$ 
 $\text{Integrate}[-2.35661 * 10^{-6} * \mathbf{x} + 0.00291777, \{\mathbf{x}, \mu - (2 * \sigma), \mu + (2 * \sigma)\}]$ 
```

Out[188]= 0.003245654308

 $2\sigma$ 

```
In[189]:=  $\mathbf{b2} =$ 
 $\text{Integrate}[-2.35661 * 10^{-6} * \mathbf{x} + 0.00291777, \{\mathbf{x}, \mu - (2 * \sigma), \mu + (2 * \sigma)\}]$ 
```

Out[189]= 0.003245654308

 $3\sigma$ 

```
In[190]:=  $\mathbf{b3} =$ 
 $\text{Integrate}[-2.35661 * 10^{-6} * \mathbf{x} + 0.00291777, \{\mathbf{x}, \mu - (2 * \sigma), \mu + (2 * \sigma)\}]$ 
```

Out[190]= 0.003245654308

$4\sigma$ 

In[191]:= **b4 =**  
**Integrate**  $\left[-2.35661 \cdot 10^{-6} * x + 0.00291777, \{x, \mu - (2 * \sigma), \mu + (2 * \sigma)\}\right]$

Out[191]= 0.003245654308

In[192]:= **b = Mean**  $\{b2, b3, b4\}$   
**db = MeanDeviation**  $\{b2, b3, s4\}$

Out[192]= 0.003245654308

Out[193]= 0.4496400236

### ■ Signal Area:

In[194]:= **A = 0.0194163;**

 $\sigma$ 

In[195]:= **s1 =**  $\frac{A}{\sigma * \sqrt{2 * \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - \sigma, \mu + \sigma\}\right]$

Out[195]= 0.01325530397

 $2\sigma$ 

In[196]:= **s2 =**  
 $\frac{A}{\sigma * \sqrt{2 * \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - (2 * \sigma), \mu + (2 * \sigma)\}\right]$

Out[196]= 0.01853285322

 $3\sigma$ 

In[197]:= **s3 =**  
 $\frac{A}{\sigma * \sqrt{2 * \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - (3 * \sigma), \mu + (3 * \sigma)\}\right]$

Out[197]= 0.01936387995

 $4\sigma$

In[198]:=

**s4 =**

$$\frac{A}{\sigma \sqrt{2 * \pi}} * \text{Integrate}\left[\text{Exp}\left[-\frac{1}{2} \left(\frac{x - \mu}{\sigma}\right)^2\right], \{x, \mu - (4 * \sigma), \mu + (4 * \sigma)\}\right]$$

Out[198]=

0.01941507012

In[199]:=

**s = Mean[{s2, s3, s4}]****ds = MeanDeviation[{s2, s3, s4}]**

Out[199]=

0.01910393443

Out[200]=

0.0003807208081

**■ SN Ratio**

In[201]:=

**s / b**

Out[201]=

5.886004059

**1836.1 keV:**