In[115]:=
```
Charting`$InteractiveHighlighting = False
```
Out[115]=
```
False
```

Data 3 to 7

In[116]:=
```
data = Join[
   Dataset[Import[ToString@StringForm["/Users/giovannigravili/Library/Mobile
              Documents/com~apple~CloudDocs/LM
              MANO/Notebooks/HS/data/ALL000``.CSV", #], "Table",
         "HeaderLines" → 18, "FieldSeparators" → ",", "NumberPoint" → ".",
         CharacterEncoding → "UTF8"]][All, Range[1, 2]][
      All, <|"t (s)" → 1, "V (V)" → 2|>] & /@ Range[1, 9],
   Dataset[Import[ToString@StringForm["/Users/giovannigravili/Library/Mobile
              Documents/com~apple~CloudDocs/LM
              MANO/Notebooks/HS/data/ALL00``.CSV", #], "Table",
         "HeaderLines" → 18, "FieldSeparators" → ",", "NumberPoint" → ".",
         CharacterEncoding → "UTF8"]][All, Range[1, 2]][
      All, <|"t (s)" → 1, "V (V)" → 2|>] & /@ Range[10, 17]];
```
In[117]:=
```
Length@data
```
Out[117]=
```
17
```
In[118]:=
```
data3to7 =
  Transpose[{#[All, "t (s)"], #[All, "V (V)"]} // Normal] & /@ Take[data, {3, 7}];
```
In[119]:=
```
Length@First@data3to7
```
Out[119]=
```
5000
```
In[120]:=
```
fd3to7 = Take[Transpose[Take[#1, #2]][[2]], {550, 1991}] &@@@
    Transpose[{data3to7, {{1500, 3500}, {1485, 3500},
       {1480, 3500}, {1445, 3500}, {1460, 3500}}}] // Evaluate;
ListLinePlot[fd3to7, ImageSize → Large, PlotLegends → Placed[Range[3, 7], Below]]
```

In[123]:=

```
gf = NonlinearModelFit[{#, a Exp[-(x - x0)^2/(2 σ^2)] + b x + c,
    {a, {x0, 500}, σ, b, c}, x, AccuracyGoal → 5, MaxIterations → 1000}] & /@ fd3to7
```

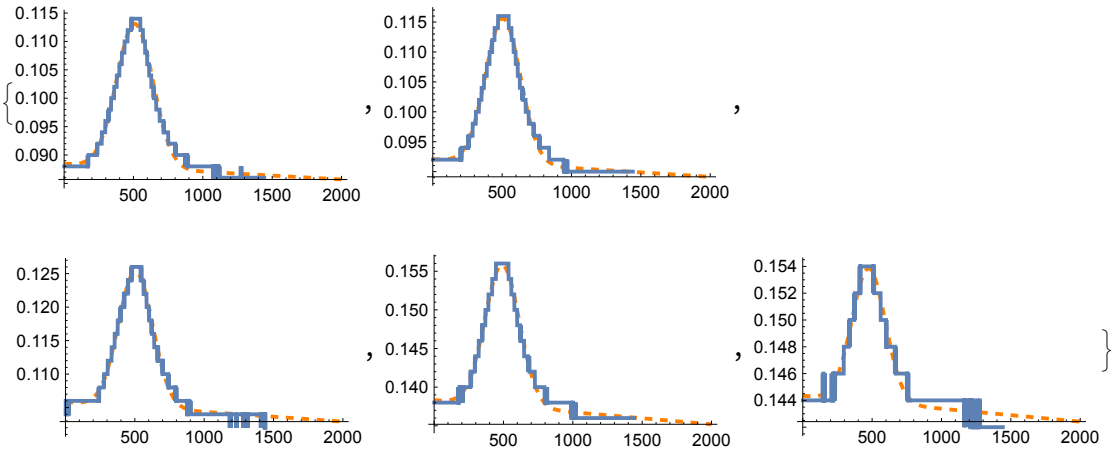
Out[123]=

$$\left\{\text{FittedModel}\left[0.0884417 + 0.0253474\ e^{-0.0000290056\ (\ll 1 \gg)^2} - 1.37494 \times 10^{-6}\ x\right],\right.$$
$$\text{FittedModel}\left[0.0920864 + 0.0242318\ e^{-0.0000314028\ (\ll 1 \gg)^2} - 1.47698 \times 10^{-6}\ x\right],$$
$$\text{FittedModel}\left[0.105826 + 0.0202313\ e^{-0.0000326895\ (\ll 1 \gg)^2} - 1.46026 \times 10^{-6}\ x\right],$$
$$\text{FittedModel}\left[0.138307 + 0.0182683\ e^{-0.0000320633\ (\ll 1 \gg)^2} - 1.55599 \times 10^{-6}\ x\right],$$
$$\left.\text{FittedModel}\left[0.144339 + 0.00995104\ e^{-0.0000341448\ (\ll 1 \gg)^2} - 9.6179 \times 10^{-7}\ x\right]\right\}$$

In[124]:=

```
Show[Plot[#2["BestFit"], {x, 0, 2000}, PlotRange → All,
    PlotStyle → {Dashed, Orange}], ListLinePlot[#1, PlotRange → All],
  PlotRange → All, ImageSize → Small] &@@@ Transpose[{fd3to7, gf}]
```

Out[124]=



In[125]:=

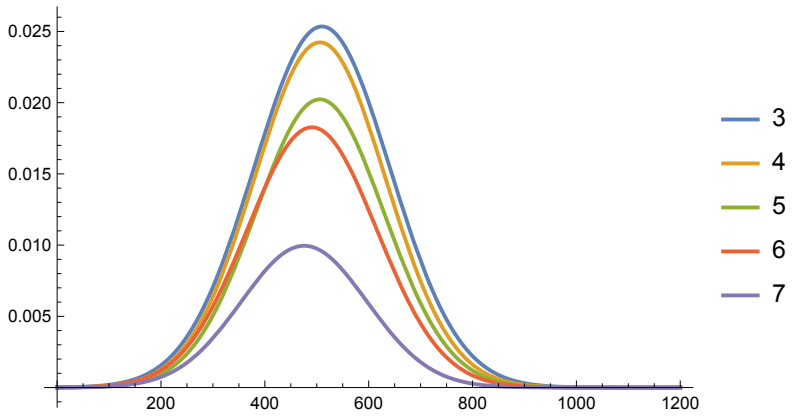
```
lc = {#["BestFitParameters"][[4]][[2]], #["BestFitParameters"][[5]][[2]]} & /@ gf
```

Out[125]=

$$\{\{-1.37494 \times 10^{-6}, 0.0884417\}, \{-1.47698 \times 10^{-6}, 0.0920864\},$$
$$\{-1.46026 \times 10^{-6}, 0.105826\}, \{-1.55599 \times 10^{-6}, 0.138307\}, \{-9.6179 \times 10^{-7}, 0.144339\}\}$$

In[126]:=
```
Plot[(#1["BestFit"] - #2[[1]] x - #2[[2]]) & @@@ Transpose[{gf, lc}] // Evaluate,
 {x, 0, 1200}, PlotLegends → Range[3, 7]]
```

Out[126]=

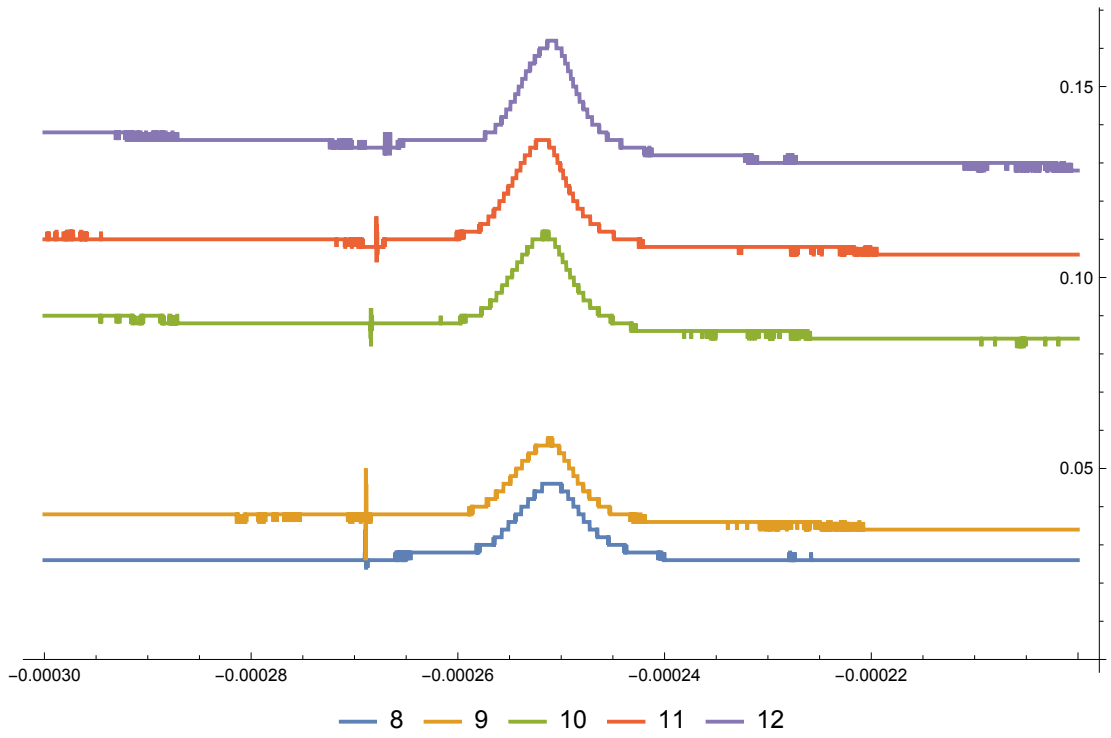


Data 8 to 12

In[127]:=
```
data8to12 =
  Transpose[{#[All, "t (s)"], #[All, "V (V)"]} // Normal] & /@ Take[data, {8, 12}];
```

In[128]:=
```
ListLinePlot[data8to12, ImageSize → Large,
 PlotLegends → Placed[Range[8, 12], Below]]
```

Out[128]=



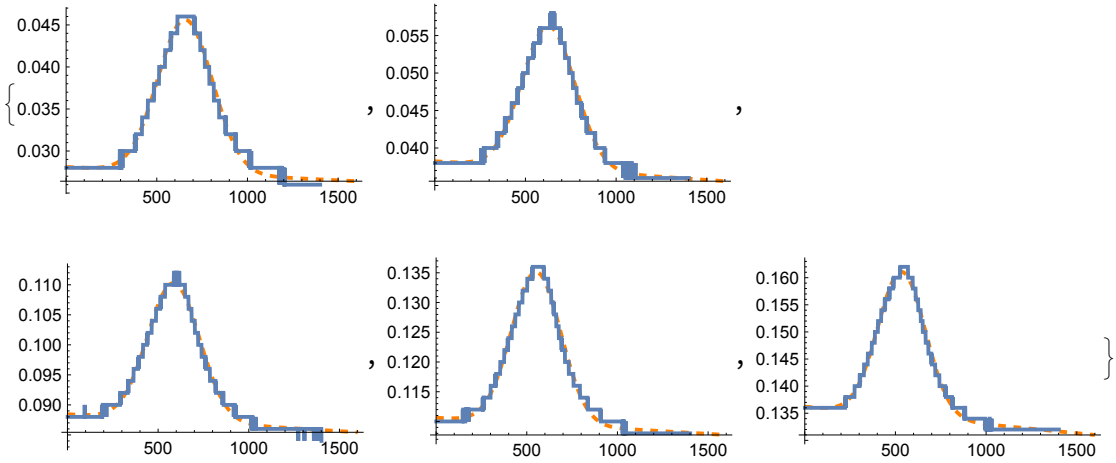
In[129]:=
```
fd8to12 = Take[Transpose[Take[#1, #2]][[2]], {800, 2200}] &@@@
    Transpose[{data8to12, {{997, 3500}, {1000, 3500},
       {1025, 3500}, {1050, 3500}, {1110, 3500}}}] // Evaluate;
ListLinePlot[fd8to12, ImageSize → Large,
 PlotLegends → Placed[Range[8, 12], Below]]
```

In[144]:=
```
gf2 = NonlinearModelFit[#, a Exp[-(x - x0)^2/(2 σ^2)] + b x + c, {a, {x0, 600}, σ, b, c},
    x, AccuracyGoal → 5, MaxIterations → 1000] & /@ fd8to12
```

Out[144]=
$$\left\{\text{FittedModel}\left[0.0280948 + 0.0182202\ e^{-0.0000219628\ (\ll 1\gg)^2} - 1.0527\times 10^{-6}\ x\right],\right.$$
$$\text{FittedModel}\left[0.0382329 + 0.0190542\ e^{-0.0000233288\ (\ll 1\gg)^2} - 1.66221\times 10^{-6}\ x\right],$$
$$\text{FittedModel}\left[0.0884417 + 0.0229326\ e^{-0.0000244054\ (\ll 1\gg)^2} - 1.87803\times 10^{-6}\ x\right],$$
$$\text{FittedModel}\left[0.110613 + 0.025508\ e^{-0.0000269638\ (\ll 1\gg)^2} - 1.8014\times 10^{-6}\ x\right],$$
$$\left.\text{FittedModel}\left[0.136211 + 0.0266138\ e^{-0.0000293978\ (\ll 1\gg)^2} - 3.25957\times 10^{-6}\ x\right]\right\}$$

In[145]:=
```
Show[Plot[#2["BestFit"], {x, 0, 1600}, PlotRange → All,
    PlotStyle → {Dashed, Orange}], ListLinePlot[#1, PlotRange → All],
   PlotRange → All, ImageSize → Small] &@@@ Transpose[{fd8to12, gf2}]
```

Out[145]=

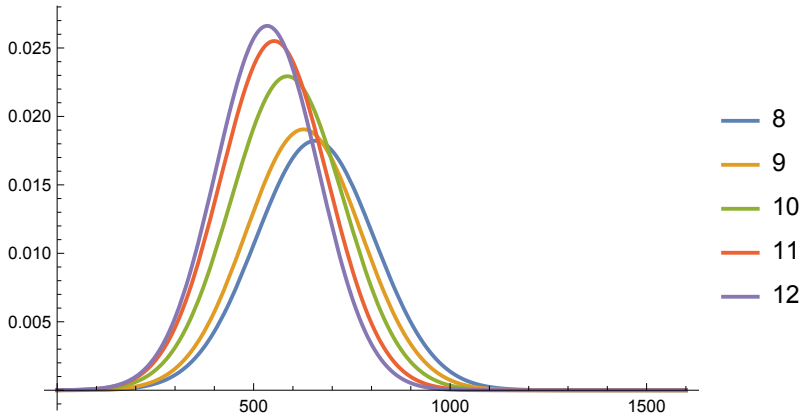


In[174]:=
```
lc2 = {#["BestFitParameters"][[4]][[2]], #["BestFitParameters"][[5]][[2]]} & /@ gf2
```

Out[174]=
$$\{\{-1.0527\times 10^{-6}, 0.0280948\},$$
$$\{-1.66221\times 10^{-6}, 0.0382329\}, \{-1.87803\times 10^{-6}, 0.0884417\},$$
$$\{-1.8014\times 10^{-6}, 0.110613\}, \{-3.25957\times 10^{-6}, 0.136211\}\}$$

In[175]:=
```
Plot[(#1["BestFit"] - #2[[1]] x - #2[[2]]) & @@@ Transpose[{gf2, lc2}] // Evaluate,
 {x, 0, 1600}, PlotLegends → Range[8, 12]]
```

Out[175]=



Data 13 to 17

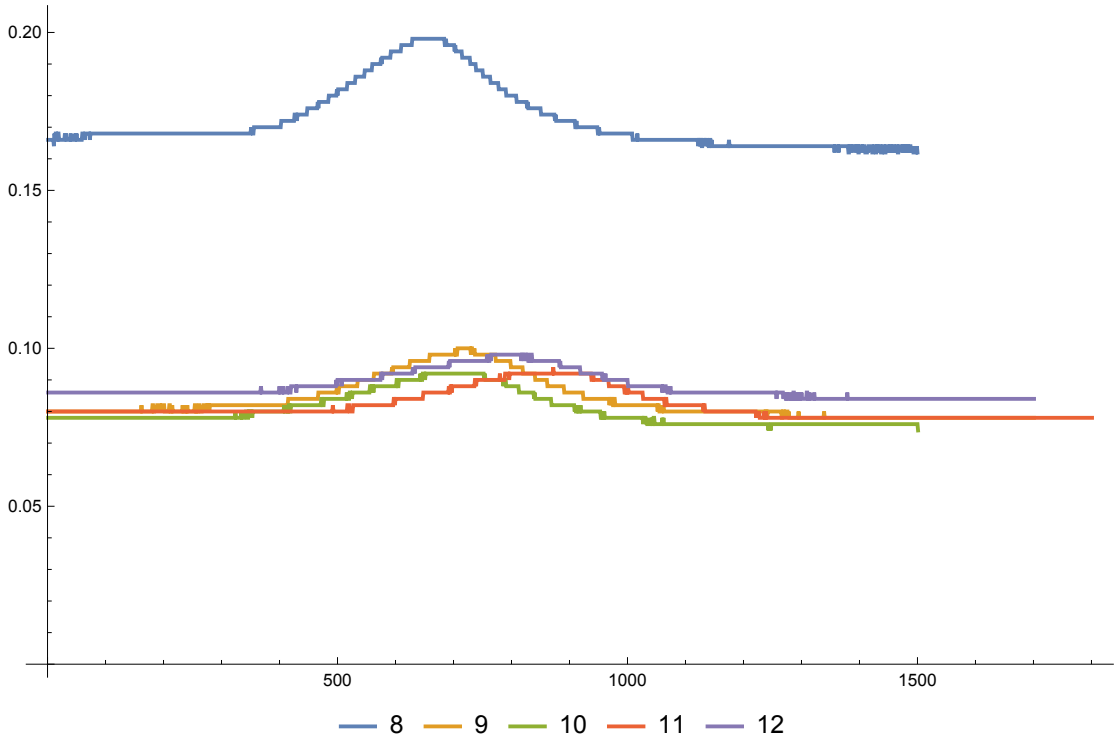
In[135]:=
```
data13to17 =
  Transpose[{#[All, "t (s)"], #[All, "V (V)"]} // Normal] & /@ Take[data, {13, 17}];
```

In[225]:=
```
ListLinePlot[Transpose[#][[2]], ImageSize → Large,
   PlotLegends → Placed[Range[13, 17], Below], PlotRange → All] & /@ data13to17
```

In[256]:=

```
fd13to17 =
  Take[Transpose[Take[#1, #2]][[2]], #3] & @@@ Transpose[{data13to17, {{1671, 5000},
       {1641, 5000}, {1862, 5000}, {1838, 5000}, {1016, 5000}}, {{1, 1500},
       {300, 2000}, {500, 2000}, {500, 2300}, {800, 2500}}}] // Evaluate;
ListLinePlot[fd13to17, ImageSize → Large,
 PlotLegends → Placed[Range[8, 12], Below], PlotRange → All]
```

Out[257]=



In[261]:=

$$gf3 = \text{NonlinearModelFit}\left[\#1,\ a\ \text{Exp}\left[\frac{-(x-x0)^2}{2\,\sigma^2}\right] + b\,x + c,\ \{a,\ \{x0,\ 700\},\ \sigma,\ b,\ c\},\ x,\ \text{AccuracyGoal} \to 5,\ \text{MaxIterations} \to 1000\right] \&\ @@@\ \text{Transpose}[\{fd13to17\}]$$

Out[261]=

$$\left\{\text{FittedModel}\left[0.168131 + 0.0304749\ e^{-0.0000314945\ (\ll 1 \gg)^2} - 2.8957 \times 10^{-6}\,x\right],\right.$$

$$\text{FittedModel}\left[0.0808659 + 0.018581\ e^{-0.0000235795\ (\ll 1 \gg)^2} - 1.64223 \times 10^{-6}\,x\right],$$

$$\text{FittedModel}\left[0.0782815 + 0.0148996\ e^{-0.000023483\ (\ll 1 \gg)^2} - 1.83652 \times 10^{-6}\,x\right],$$

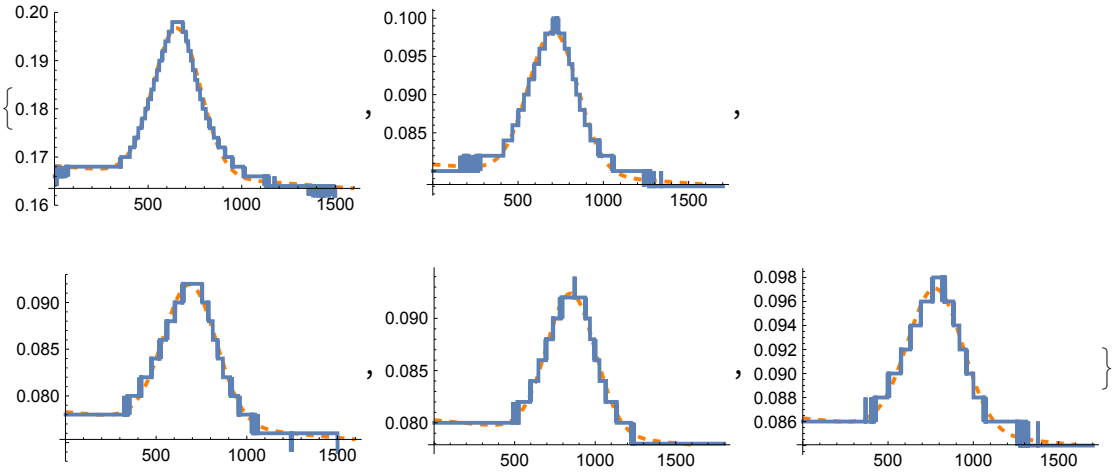
$$\text{FittedModel}\left[0.0802606 + 0.0133784\ e^{-0.0000219736\ (\ll 1 \gg)^2} - 1.47648 \times 10^{-6}\,x\right],$$

$$\left.\text{FittedModel}\left[0.0862699 + 0.0118792\ e^{-0.0000188003\ (\ll 1 \gg)^2} - 1.37553 \times 10^{-6}\,x\right]\right\}$$

In[262]:=

```
Show[Plot[#2["BestFit"], {x, 0, 1600}, PlotRange → All,
    PlotStyle → {Dashed, Orange}], ListLinePlot[#1, PlotRange → All],
   PlotRange → All, ImageSize → Small] &@@@ Transpose[{fd13to17, gf3}]
```

Out[262]=



In[263]:=

```
lc3 = {#["BestFitParameters"][[4]][[2]], #["BestFitParameters"][[5]][[2]]} &/@ gf3
```

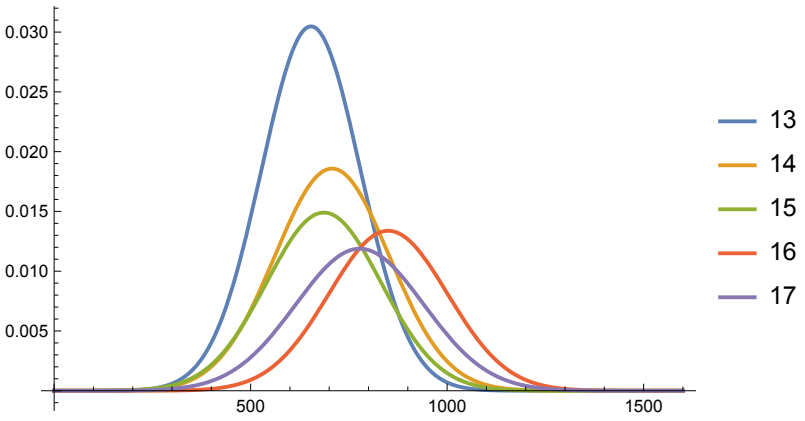
Out[263]=

$$\{\{-2.8957\times10^{-6}, 0.168131\},\ \{-1.64223\times10^{-6}, 0.0808659\}, \{-1.83652\times10^{-6}, 0.0782815\},\ \{-1.47648\times10^{-6}, 0.0802606\}, \{-1.37553\times10^{-6}, 0.0862699\}\}$$

In[265]:=

```
Plot[(#1["BestFit"] - #2[[1]] x - #2[[2]]) &@@@ Transpose[{gf3, lc3}] // Evaluate,
 {x, 0, 1600}, PlotLegends → Range[13, 17]]
```

Out[265]=



Last stuff IV curves

In[138]:=
```
datalast =
  Dataset[Import[ToString@StringForm["/Users/giovannigravili/Library/Mobile
            Documents/com~apple~CloudDocs/LM
            MANO/Notebooks/HS/data/ALL00``.CSV", #], "Table",
          "HeaderLines" → 18, "FieldSeparators" → ",", "NumberPoint" → ".",
          CharacterEncoding → "UTF8"]][All, Range[1, 4]][
      All, <|"t₁ (s)" → 1, "Vₓ (V)" → 2, "t₂ (s)" → 3,
       "V_y (V)" → 4|>] & /@ Range[18, 19];
```

In[139]:=
```
datalast2 = Transpose[{#[All, "Vₓ (V)"], #[All, "V_y (V)"]} // Normal] & /@ datalast;
```

In[140]:=
```
Length@First@datalast2
```

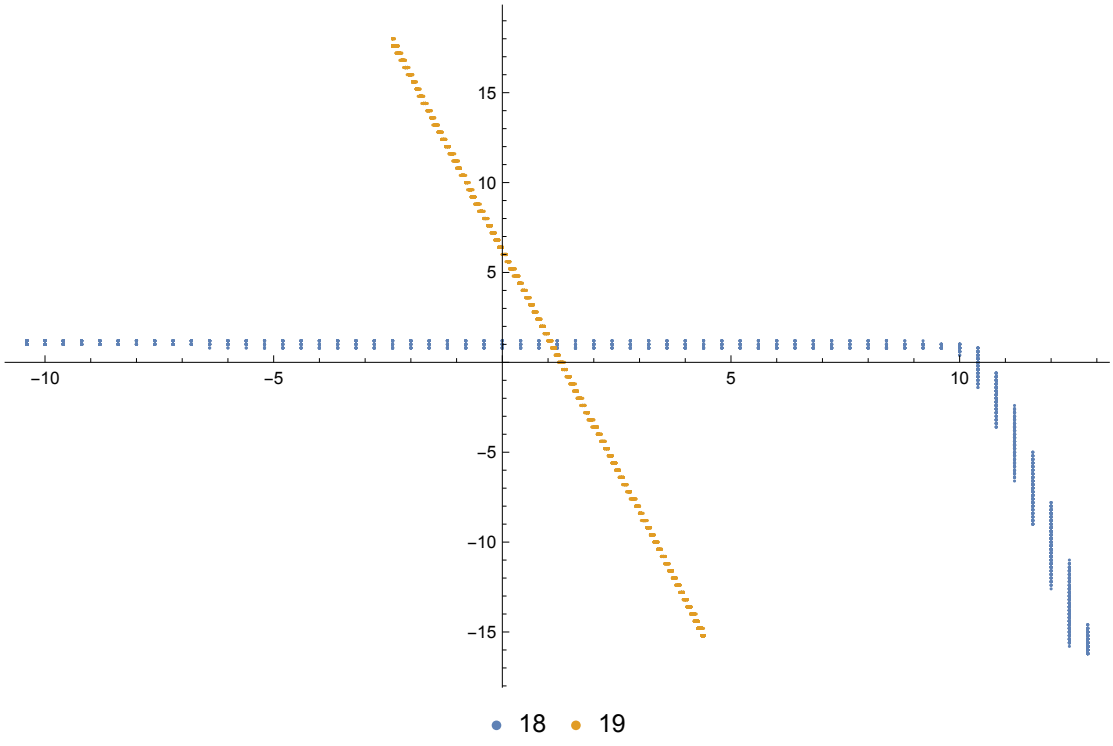
Out[140]=
```
5000
```

In[141]:=
```
fit = NonlinearModelFit[First@datalast2, -a Exp[k (x - x0)] + b, {a, b, k, x0}, x]
```

Out[141]=
```
FittedModel[1.24089 - 0.00704839 ℯ^(0.695075 (-1.53499 + x))]
```

In[142]:=
```
Show[ListPlot[datalast2, ImageSize → Large,
  PlotLegends → Placed[{18, 19}, Below], PlotRange → All](*,
 Plot[fit[x],{x,-10,18},ImageSize→Large,PlotStyle→{Dashed,Orange}]*)]
```

Out[142]=



In[143]:=