

SEPIR Modell

Modellierung Testverfahren,

Verlässlichkeit (Sensibilität) η , Spezifität 100%,

mit Testquote β ab ta = Mitte Okt oder ...

2 Szenarien beide ohne social distancing

genannt "PCR": $l=1, \beta=0.9$

bzw. "Antigen": $l=4, \beta=0.7$

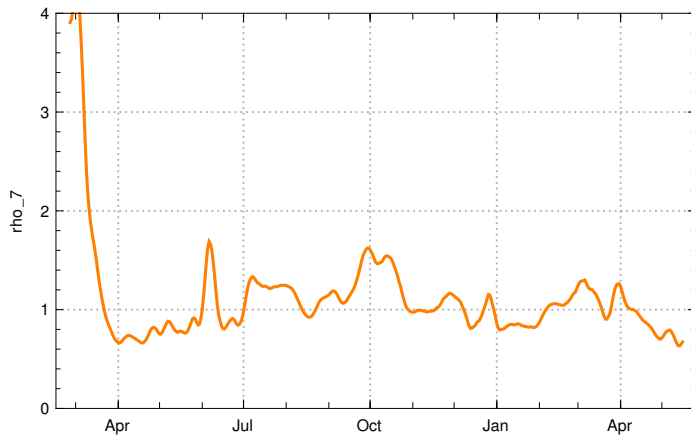
07.06.2021

Vorbereitung: Laden/Aufbereitung der Daten und Hilfsfunktionen

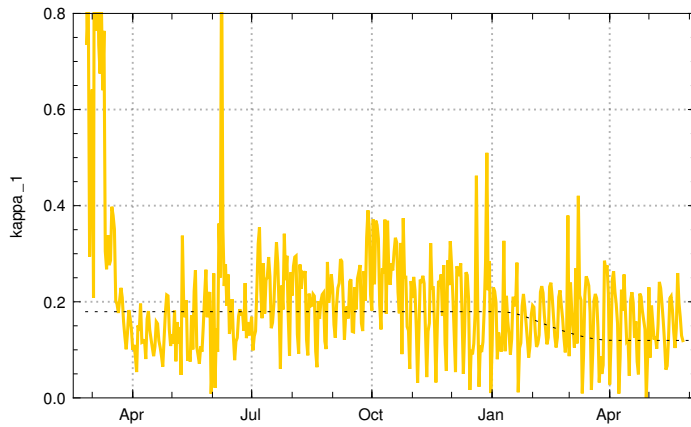
```
In[ ] := NotebookEvaluate [
  |werte aus im Notebook
  |
  |"//home/erhard/Dropbox/Mathematica_notebooks /Corona/0-Standardmoduln /dat-Germany-2021-
  |05-31.nb"]
  |
  |e = 2 pc= 7 pd= 10, q = 15, N0 = 84 000 000
  |t0 inJHU-Zählung t0JHU=35 i.e. {2020, 2, 25}
  |Test DatePlus [datet0, tMarch1] = {2020, 3, 1}
  |letztes QneuJHU = 1964
  |letztes Qneu7JHU = 3026.14
  |Inhalt der Datei ImpfungenD =
  |{date, dosen_kumulativ, dosen_differenz _zum_vortag, dosen_erst_differenz _zum_vortag,
  |dosen_zweit_differenz _zum_vortag, dosen_biontech_kumulativ,
  |dosen_moderna_kumulativ, dosen_astrazeneca_kumulativ, personen_erst_kumulativ,
  |personen_voll_kumulativ, impf_quote_erst, impf_quote_voll, indikation_alter _dosen,
  |indikation_beruf _dosen, indikation_medizinisch _dosen, indikation_pflegeheim _dosen,
  |indikation_alter _erst, indikation_beruf _erst, indikation_medizinisch _erst,
  |indikation_pflegeheim _erst, indikation_alter _voll, indikation_beruf _voll,
  |indikation_medizinisch _voll, indikation_pflegeheim _voll, dosen_dim_kumulativ,
  |dosen_kbv_kumulativ, dosen_johnson_kumulativ, dosen_biontech_erst_kumulativ,
  |dosen_biontech_zweit_kumulativ, dosen_moderna_erst_kumulativ,
  |dosen_moderna_zweit_kumulativ, dosen_astrazeneca_erst_kumulativ,
  |dosen_astrazeneca_zweit_kumulativ, dosen_erst_kumulativ, dosen_zweit_kumulativ }
  |
  |sJHU(1. Okt 2020)=0.992299
  |t1(rhokappa7)=29 i.e. {2020, 3, 24}
  |eod =502 i.e. {2021, 6, 6}
  |t1(kappa7)=29 i.e. {2020, 3, 24}
```

end of kappa7 {2021, 5, 24}

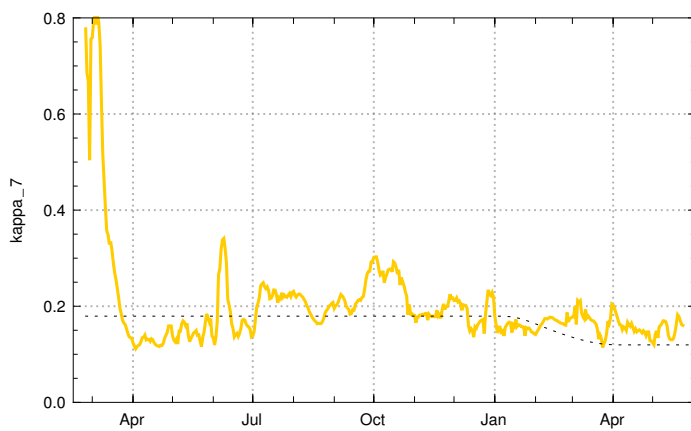
end of RhoJHU7 {2021, 5, 16}



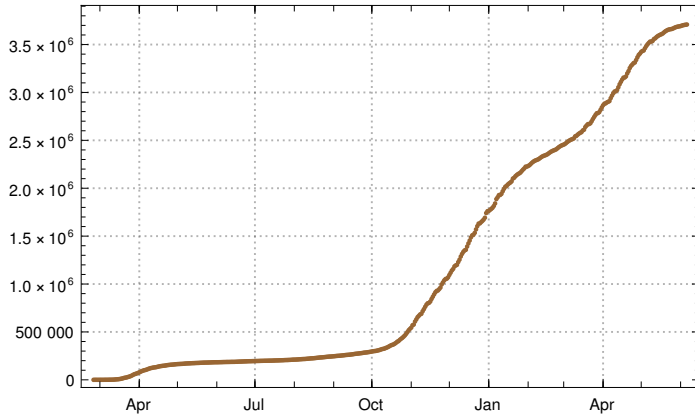
Graph Rhokappa7 <graph-D-rhokappa7 .pdf>



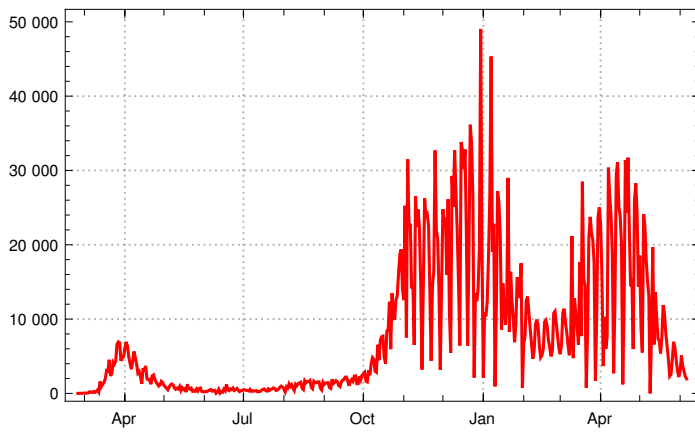
Graph kappa1 with critical value (dotted) <graph-D-kappa1 .pdf>



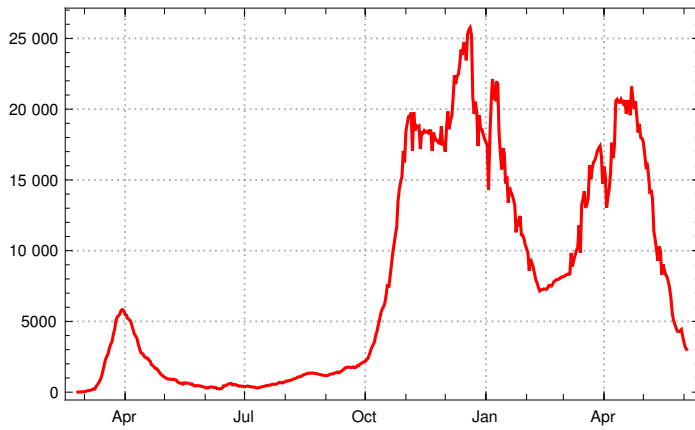
Graph kappa7 with critical value (dotted) <graph-D-kappa7 .pdf>



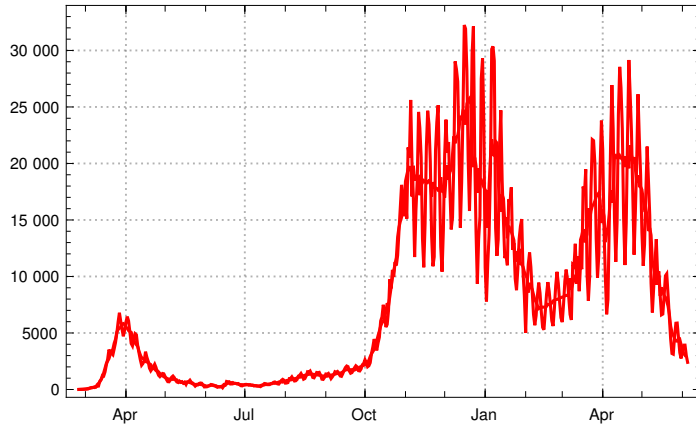
Graph Conf <graph-D-Conf.pdf>



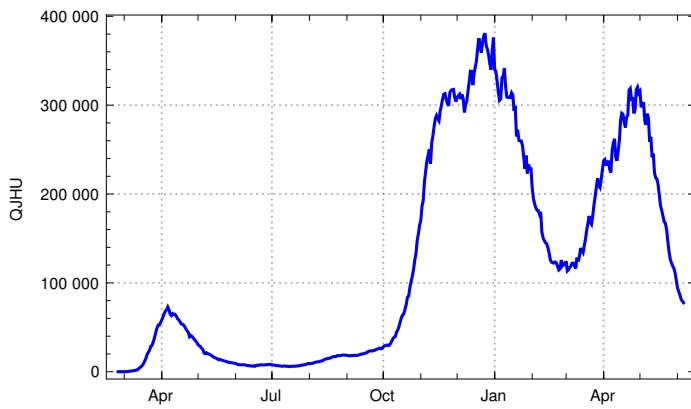
Graph QneuJHU } <graph-D-QneuJHU.pdf>



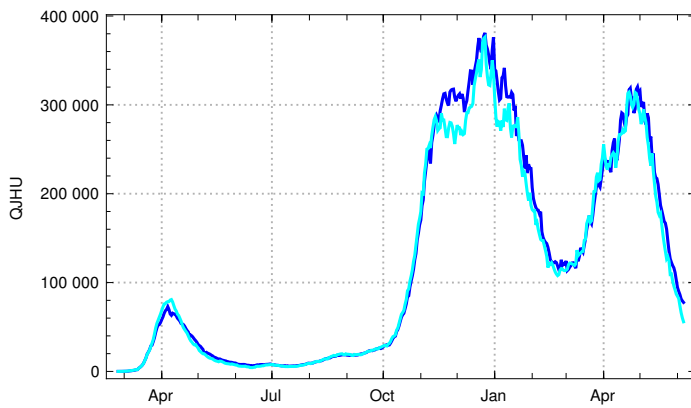
Graph Qneu7JHU <graph-D-Qneu7JHU.pdf>



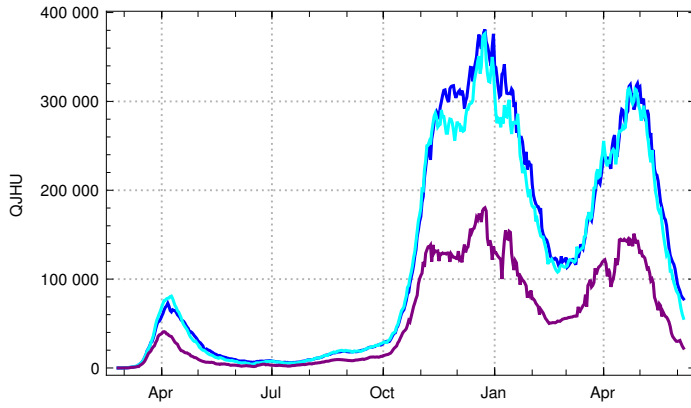
Graph Qneu7JHU und Qneu3JHU <graph-D-Qneu3-7JHU.pdf>



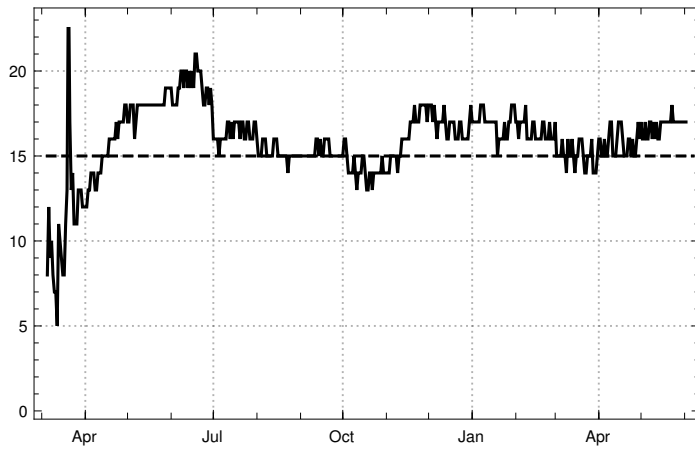
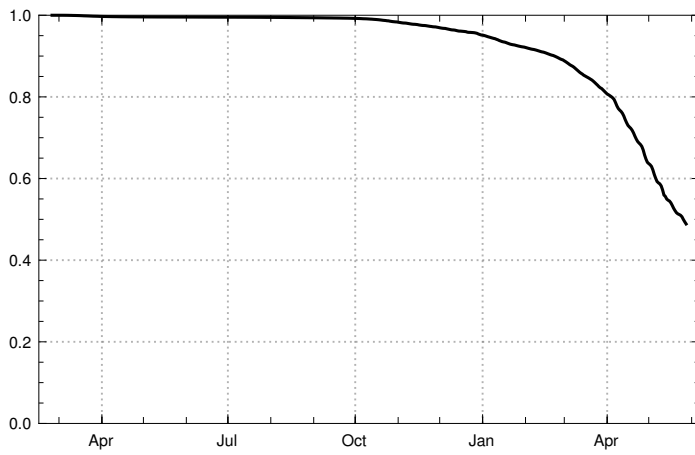
Graph QJHU <graph-D-QJHU.pdf>



Graph QJHU und QqJHU <graph-D-A-Aq-JHU.pdf>



Graph QJHU , QqJHU , PJHU <graph-D-A-Aq-P-JHU.pdf>



Graph q(k) <graph-D-q(k).pdf>


```

    |addiere zu Datum
datet8 = DatePlus[datet0, -1 + t8 /. parT];
    |addiere zu Datum
(*datet9=DatePlus[datet0, -1+t9/.parT];
    |addiere zu Datum
datet10=DatePlus[datet0, -1+t10/.parT];
    |addiere zu Datum
datet11=DatePlus[datet0, -1+t11/.parT];
    |addiere zu Datum
datet12=DatePlus[datet0, -1+t12/.parT];
    |addiere zu Datum
datet13=DatePlus[datet0, -1+t13/.parT];*)
    |addiere zu Datum

eod = DatePlus[datet0, Length[QJHU] - 1];
    |addiere zu Datum    |Länge
Print["t0=", t0 /. parT, ", t0JHU=", t0JHU, ", i.e. ", datet0];
    |gib aus
Print["t1=", t1 /. parT, ", t1JHU=", t0JHU + t1 /. parT, ", i.e. ", datet1];
    |gib aus
Print["t2=", t2 /. parT, ", t2JHU=", t0JHU + t2 /. parT, ", i.e. ", datet2];
    |gib aus
Print["t3=", t3 /. parT, ", t3JHU=", t0JHU + t3 /. parT, ", i.e. ", datet3];
    |gib aus
Print["t4=", t4 /. parT, ", t4JHU=", t0JHU + t4 /. parT, ", i.e. ", datet4];
    |gib aus
Print["t5=", t5 /. parT, ", t5JHU=", t0JHU + t5 /. parT, ", i.e. ", datet5];
    |gib aus
Print["t6=", t6 /. parT, ", t6JHU=", t0JHU + t6 /. parT, ", i.e. ", datet6];
    |gib aus
Print["t7=", t7 /. parT, ", t7JHU=", t0JHU + t7 /. parT, ", i.e. ", datet7];
    |gib aus
Print["t8=", t8 /. parT, ", t8JHU=", t0JHU + t8 /. parT, ", i.e. ", datet8];
    |gib aus
(*Print["t9=",t9/.parT, ", t9JHU=", t0JHU+t9/.parT,", i.e. ", datet9];
    |gib aus
Print["t10=",t10/.parT, ", t10JHU=", t0JHU+t10/.parT,", i.e. ", datet10];
    |gib aus
Print["t11=",t11/.parT, ", t10JHU=", t0JHU+t11/.parT,", i.e. ", datet11];
    |gib aus
Print["t12=",t12/.parT, ", t10JHU=", t0JHU+t12/.parT,", i.e. ", datet12];
    |gib aus
Print["t13=",t13/.parT, ", t10JHU=", t0JHU+t13/.parT,", i.e. ", datet13];*)
    |gib aus
Print["eod=", Length[QJHU], " i.e. ", eod];(*Intervall-Mittelwerte der a-quer(k) *)
    |gib aus    |Länge
κ = N[Mean[Take[kappa7, {t0, t1} /. parT]],
    |...|ari... |entferne

```

```

    Mean[Take[kappa7, {t1, t2 - Δ2} /. parT]],
    Mean[Take[kappa7, {t2, t3 - Δ3} /. parT]],
    Mean[Take[kappa7, {t3, t4 - Δ4} /. parT]],
    Mean[Take[kappa7, {t4, t5 - Δ5} /. parT]],
    Mean[Take[kappa7, {t5, t6 - Δ6} /. parT]],
    Mean[Take[kappa7, {t6, t7 - Δ7} /. parT]],
    Mean[Take[kappa7, {t7, t8 - Δ8} /. parT]],
    Mean[Take[kappa7, {t8, Length[kappa7]} /. parT]](*,
    Mean[Take[kappa7, {t9, Length[kappa7]} /. parT]],
    Mean[Take[kappa7, {t10, Length[kappa7]} /. parT]] (
    Mean[Take[kappa7, {t11, t12} /. parT]]
    Mean[Take[kappa7, {t12, t13 - Δ13} /. parT]],
    Mean[Take[kappa7, {t13, Length[kappa7]} /. parT]]*)
  ];

```

```

sigmaK = {StandardDeviation [Take[kappa7, {t0, t1 - 1} /. parT]],
    StandardDeviation [Take[kappa7, {t1, t2 - Δ2} /. parT]],
    StandardDeviation [Take[kappa7, {t2, t3 - Δ3} /. parT]],
    StandardDeviation [Take[kappa7, {t3, t4 - Δ4} /. parT]],
    StandardDeviation [Take[kappa7, {t4, t5 - Δ5} /. parT]],
    StandardDeviation [Take[kappa7, {t5, t6 - Δ6} /. parT]],
    StandardDeviation [Take[kappa7, {t6, t7 - Δ7} /. parT]],
    StandardDeviation [Take[kappa7, {t7, t8 - Δ8} /. parT]],
    StandardDeviation [Take[kappa7, {t8, Length[kappa7]} /. parT]] (*,

```



```

Standardabweichung      Entfernung      Länge
StandardDeviation [Take[kappa7,{t9,Length[kappa7]}/.parT]],
Standardabweichung      Entfernung      Länge
StandardDeviation [Take[kappa7,{t10,Length[kappa7]}/.parT]],
Standardabweichung      Entfernung      Länge
StandardDeviation [Take[kappa7,{t11,t12}/.parT]],
Standardabweichung      Entfernung
StandardDeviation [Take[kappa7,{t12,t13-Δ13}/.parT]],
Standardabweichung      Entfernung
StandardDeviation [Take[kappa7,{t13,Length[kappa7]}/.parT]]*)
Standardabweichung      Entfernung      Länge
};

t0=1,  t0JHU=35,  i.e. {2020, 2, 25}
t1=29,  t1JHU=64,  i.e. {2020, 3, 24}
t2=62,  t2JHU=97,  i.e. {2020, 4, 26}
t3=132,  t3JHU=167,  i.e. {2020, 7, 5}
t4=218,  t4JHU=253,  i.e. {2020, 9, 29}
t5=250,  t5JHU=285,  i.e. {2020, 10, 31}
t6=276,  t6JHU=311,  i.e. {2020, 11, 26}
t7=296,  t7JHU=331,  i.e. {2020, 12, 16}
t8=377,  t8JHU=412,  i.e. {2021, 3, 7}
eod=468 i.e. {2021, 6, 6}

In[ ]:= Print["letztes κ am ", datendkappa]
      gib aus
      letztes κ am {2021, 5, 24}

In[ ]:=

In[ ]:= Print["κ = ", κ];
      gib aus
      κ =
      {0.496097 , 0.130688 , 0.167522 , 0.208276 , 0.279392 , 0.180225 , 0.208846 , 0.166144 , 0.157396 }

In[ ]:= Print["sigmax = ", sigmax];
      gib aus
      sigmax = {0.229569 , 0.0149033 , 0.0524143 ,
      0.0213191 , 0.0146389 , 0.00541032 , 0.00849333 , 0.0204529 , 0.020482 }

In[ ]:=

In[ ]:= Length[κ]
      Länge

Out[ ]:= 9

```

In[*]:=

```

faktor1 = 1; faktor2 = 1;
a1 = κ[[2]](*-0.3 sigmaκ[[2]]*); a2 = κ[[3]] - 0.1 sigmaκ[[3]]; a3 = κ[[4]](*-0.6 sigmaκ[[4]]*);
a4 = κ[[5]] - 0.6 sigmaκ[[5]]; a5 = κ[[6]] - 0.2 sigmaκ[[6]]; a6 = κ[[7]] (*-0.1 sigmaκ[[7]]*);
a7 = κ[[8]] - 0.15 sigmaκ[[8]];
a8 = κ[[9]] + 0.25 sigmaκ[[9]];

aa[x_] = a1 suppMult[x, t2 - Δ2, t2,  $\frac{a2}{a1}$ ] * suppMult[x, t3 - Δ3, t3,  $\frac{a3}{a2}$ ] *
  suppMult[x, t4 - Δ4, t4,  $\frac{a4}{a3}$ ] * suppMult[x, t5 - Δ5, t5,  $\frac{a5}{a4}$ ] *
  suppMult[x, t6 - Δ6, t6,  $\frac{a6}{a5}$ ] * suppMult[x, t7 - Δ7, t7,  $\frac{a7}{a6}$ ] * suppMult[x, t8 - Δ8, t8,  $\frac{a8}{a7}$ ]
  (*suppMult[x, t10 - Δ10, t10,  $\frac{a10}{a9}$ ] suppMult[x, t11 - Δ11, t11,  $\frac{a11}{a10}$ ]
  suppMult[x, t12 - Δ12, t12,  $\frac{a12}{a11}$ ]) / . parT;
aModel = Table[aa[k], {k, t1 / . parT, kend}];
  [Tabelle]

GraphaModel = DateListPlot[Take[aModel, Length[kappa7] + 15], datet1,
  [graphische Darst... [entferne [Länge]
  PlotStyle → {Black, Dashed}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  [Darstellungsstil [schwarz [gestrichelt [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß]
  GridLines → {"{2020,03,24}", "{2020,04,26}", "{2020,07,05}", "{2020,09,27}",
  [Gitternetzlinien]
  "{2020,10,31}", "{2020,12,6}", "{2021,03,02}"}, Automatic], PlotRange → {0, 0.4}];
  [automatisch [Koordinatenbereich der Graphik]

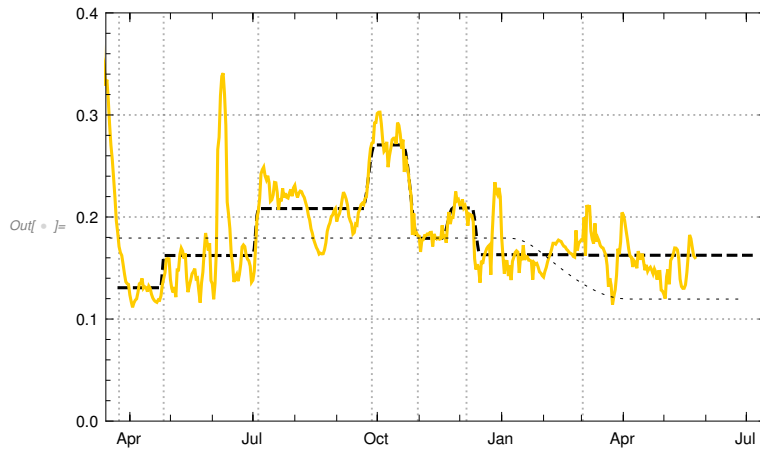
Graphkappa7A = DateListPlot[Take[kappa7, Length[kappa7]], datet0, (*Joined→False,*)
  [graphische Darst... [entferne [Länge] [verknüpft? [falsch]
  PlotStyle → {Colorkappa}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  [Darstellungsstil [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß]
  PlotRange → {0, 0.8}, FrameLabel → {None, "kappa"}];
  [Koordinatenbereich der Grap... [Rahmenbeschrift... [keine]

Graphcrit = DateListPlot[Table[1/ptilde[k], {k, 1, tMay12021 + 60}], datet0, Sequence[
  [graphische Darst... [Tabelle] [Sequenz]
  PlotTheme → "Detailed", ImageSize → Medium], PlotStyle → {Black, Thin, Dotted}];
  [Thema der graphischen Darstellung [Bildgröße [mittelgroß] [Darstellungsstil [schwarz [dünn [punktier]

Print["a1=", a1, " a2=", a2, " a3 =", a3, " a4 =", a4, " a5 =", a5,
  [gib aus]
  " a6 =", a6, " a7 =", a7 (*, " a8 =", a8 , " a9 =", a9 ,
  " a10 =", a10 , " a11 =", a11 , " a12 =", a12, " a13 =", a13*]);
Show[GraphaModel, Graphkappa7A, Graphcrit]
  [zeige an]

```

```
a1=0.130688 a2=0.16228 a3 =0.208276
a4 =0.270609 a5 =0.179143 a6 =0.208846 a7 =0.163076
```



```
Export["file-path/Check-Lehrach-2021-06-07kappa-Mod-2021-06-07.pdf", %]
```

[exportiere](#)

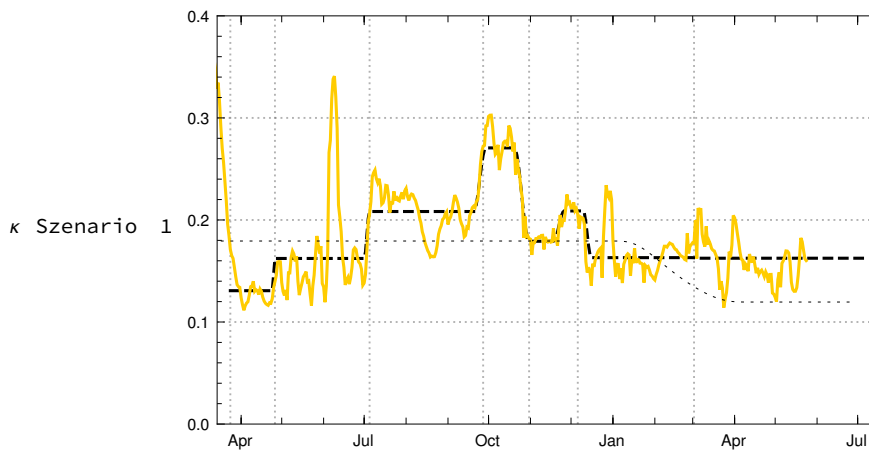
[prüfe](#)

[Modulo](#)

```
In[ ]:= Print["κ Szenario 1 ", Show[GraphaModel , Graphkappa7A , Graphcrit]]
```

[gib aus](#)

[zeige an](#)



```
In[ ]:=
```

```
In[ ]:= a8 / a7
```

```
Out[ ]:= 1.05611
```

```
In[ ]:=
```

Vergleich von zwei Teststrategien , beide mit täglichem Test, beide nur mit Kontaktbeschränkungen wie im späten September 2020

Szenario 1: "PCR"

Szenario 2 "Antigen"

abgeänderte Kontaktraten (fiktiv)

kappa4 ab t4,

In[]:=

In[]:=

```
(*kappa1=0.25;*)
a1 = κ[[2]](*-0.3sigmaκ[[2]]*); a2 = κ[[3]] - 0.1 sigmaκ [[3]] ;
a3 = κ[[4]](*-0.6sigmaκ [[4]]*); a4 = κ[[5]] - 0.6 sigmaκ [[5]];
(*κ[[5]]-0.6sigmaκ [[5]]; a5=κ[[6]] -0.2sigmaκ [[6]]; a6=κ[[7]] (*-0.1sigmaκ [[7]]*);
a7=κ[[8]] -0.15sigmaκ [[8]];
a8= κ[[9]] +0.4sigmaκ [[9]]*)

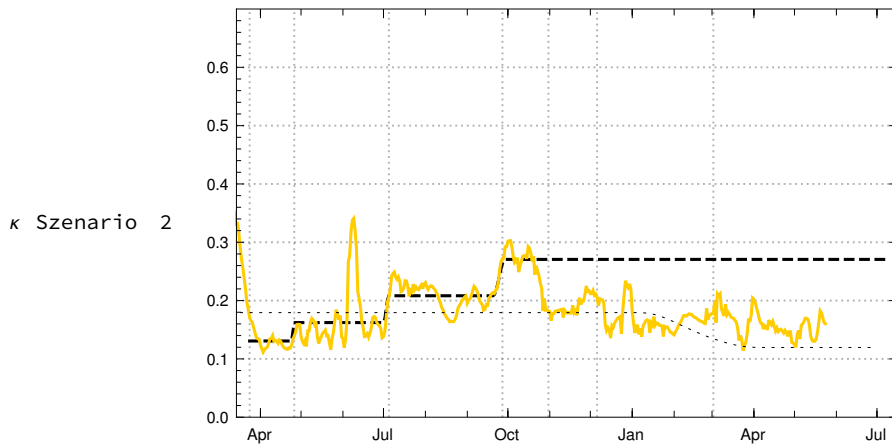
aa[x_] = a1 suppMult[x, t2 - Δ2, t2,  $\frac{a2}{a1}$ ] *
  suppMult[x, t3 - Δ3, t3,  $\frac{a3}{a2}$ ] * suppMult[x, t4 - Δ4, t4,  $\frac{a4}{a3}$ ]
  (*suppMult[x, t4 - Δ4, t4,  $\frac{a4}{a3}$ ]suppMult[x, t5 - Δ5, t5,  $\frac{a5}{a4}$ ] suppMult[x, t6 - Δ6, t6,  $\frac{a6}{a5}$ ]
  suppMult[x, t7 - Δ7, t7,  $\frac{a5}{a6}$ ]suppMult[x, t8 - Δ8, t8,  $\frac{a8}{a7}$ ]suppMult[x, t10 - Δ10, t10,  $\frac{a10}{a9}$ ]
  suppMult[x, t11 - Δ11, t11,  $\frac{a11}{a10}$ ]suppMult[x, t12 - Δ12, t12,  $\frac{a12}{a11}$ ]) / . parT;
aModel = Table[aa[k], {k, t1 /. parT, kend}];
  |Tabelle
GraphaModel = DateListPlot [Take[aModel, Length[kappa7] + 15], datet1,
  |graphische Darst... |entferne |Länge
  PlotStyle → {Black, Dashed}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  |Darstellungsstil |schwarz |gestrichelt |Sequenz |Thema der graphischen Darstellung |Bildgröße |mittelgroß
  (*GridLines → {{{"2020, 03, 24"} , Thick}, {"2020, 04, 26"} , Thick},
  |Gitternetzlinien |dick |dick
  {"2020, 07, 05"} , Thick}, {"2020, 09, 27"} , Thick}, {"2020, 10, 31"} , Thick},
  |dick |dick |dick
  {"2020, 12, 6"} , Thick}, {"2021, 03, 02"} , Thick}}, {0.1, 0.2, 0.3, 0.4}}, *)
  |dick |dick
  GridLines → {"2020, 03, 24"} , {"2020, 04, 26"} , {"2020, 07, 05"} , {"2020, 09, 27"} ,
  |Gitternetzlinien
  {"2020, 10, 31"} , {"2020, 12, 6"} , {"2021, 03, 02"}}, Automatic}, PlotRange → {0, 0.7}];
  |automatisch |Koordinatenbereich der Graphik
Graphkappa7A = DateListPlot [Take[kappa7, Length[kappa7]], datet0, (*Joined→False, *)
  |graphische Darst... |entferne |Länge |verknüpft? |falsch
  PlotStyle → {Colorkappa}, Sequence[PlotTheme → "Detailed", ImageSize → Medium],
  |Darstellungsstil |Sequenz |Thema der graphischen Darstellung |Bildgröße |mittelgroß
  (*GridLines → {{{"2020, 03, 24"} , Thick}, {"2020, 04, 26"} , Thick}, {"2020, 07, 05"} , Thick},
  |Gitternetzlinien |dick |dick |dick
  {"2020, 09, 27"} , Thick}, {"2020, 10, 31"} , Thick}, {"2020, 12, 6"} , Thick},
  |dick |dick |dick
```

```

    {"{2021,03,02}",Thick}},{0.1,0.2,0.3,0.4,0.5,0.6,0.7}},*)
    PlotRange → {0, 0.8}, FrameLabel → {None, "kappa"}];
    Graphcrit = DateListPlot [Table[1/ptilde[k], {k, 1, tMay12021 + 60}], datet0, Sequence[
    PlotTheme → "Detailed", ImageSize → Medium], PlotStyle → {Black, Thin, Dotted}];
    Print["a1=", a1, " a2=", a2, " a3 =", a3, " a4 =", a4, " a5 =", a5
    (*, " a6 =", a6, " a7 =", a7, " a8 =", a8, " a9 =", a9,
    " a10 =", a10, " a11 =", a11, " a12 =", a12, " a13 =", a13*);
    Print["κ Szenario 2 " Show[GraphaModel, Graphkappa7A, Graphcrit]];
    Print["Kontakraten mit social distancing wie Sep 2020 ohne weitere Massnahmen"]

```

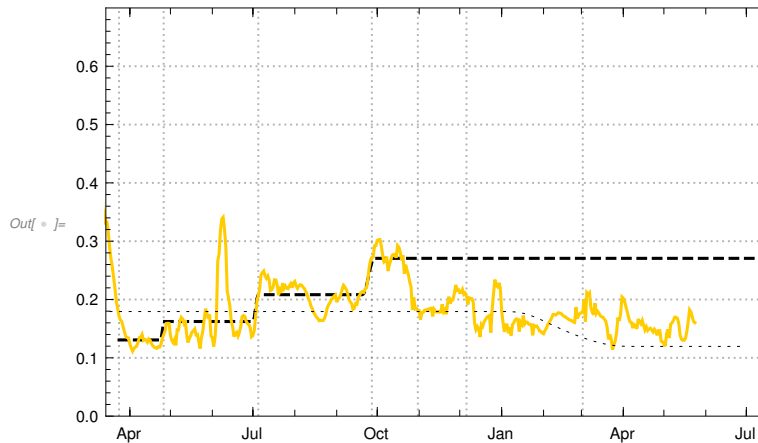
a1=0.130688 a2=0.16228 a3 =0.208276 a4 =0.270609 a5 =0.179143



Kontakraten mit social distancing wie Sep 2020 ohne weitere Massnahmen

```
In[ * ]:= Show[GraphaModel , Graphkappa7A , Graphcrit]
```

zeige an



```
Out[ * ]:=
```

```
Export["//kappa-Mod-Test-2021-06-07.pdf", %]
```

exportiere

Modulo

```
"/file-path//kappa-Mod-Test-2021-06-07.pdf"
```

Modulo

Szenario 1 "PCR", tägliche Tests $\eta = 0.9$

Szenario 1a, Testquote $\beta=100\%$, tägliche Tests

```
In[ * ]:=
```

```
 $\beta = 1$  (*Testquote*);  $\eta = 0.9$  (*reliability des Tests*);
```

```
 $l = 1$  (*erster Tag der Sensibilität des Tests*);
```

```
 $t_a = t_{Oct1} + 15 - 1$ ;
```

```
 $x_{TestA}[x_] = Piecewise[{{0, x < t_a}, {1, x \geq t_a}}$  (*Anschaltfunktion des Tests*);
```

stückweise

```
Testzykel = {1, 0, 0, 1, 0, 0, 0};
```

```
TestB = Join[Table[0, {ta - 1}], Table[ $\eta$ , {kend}]]
```

ver... Tabelle

Tabelle

```
(*Definition der Testfrequenz und -effektivität*);
```

Definition

```
Take[TestB, {ta - 5, ta + 15}]
```

entferne

```
Out[ * ]:= {0, 0, 0, 0, 0, 0.9, 0.9, 0.9, 0.9, 0.9,
           0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9}
```

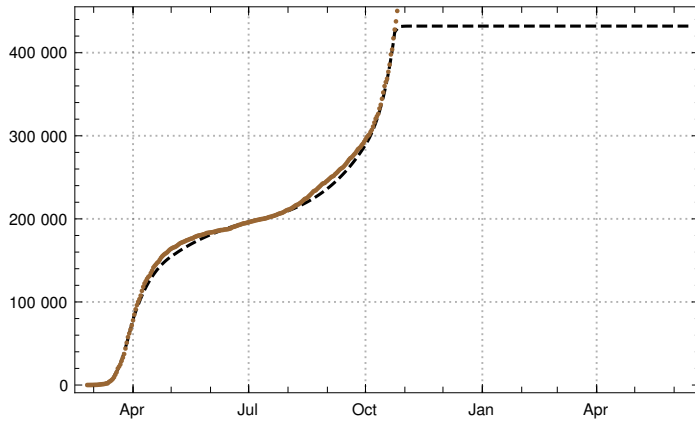
```
Run <SEPAR-recursion-2014-04-17.nb> version (iv)
```

```
NotebookEvaluate["/file-path/SEPAR-recursion-Version-iv-2021-05-31.nb"]
```

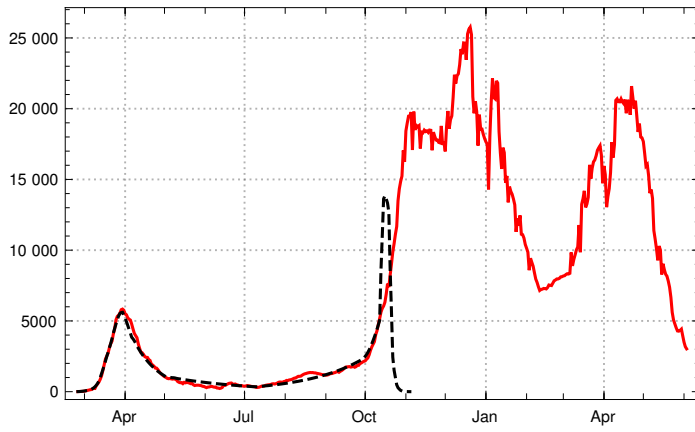
werte aus im Notebook

```
a0=1.04078 RMESQtot = 1.27677  $\times 10^6$ 
```

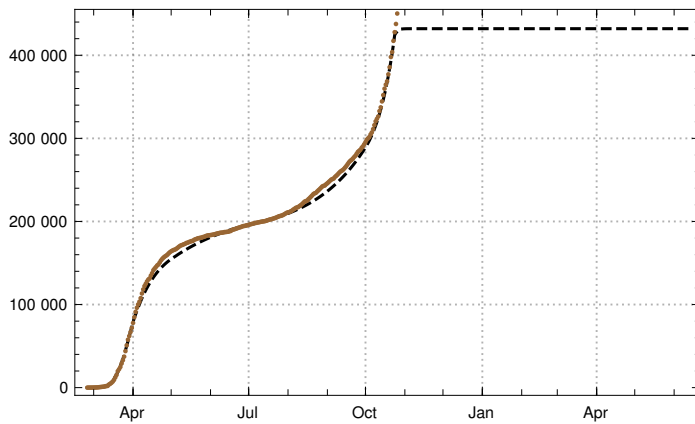
RMESE Anew= 11088.7



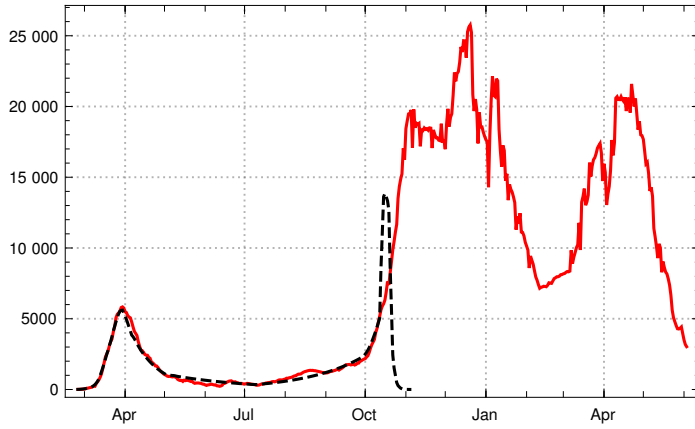
Graph Qtot SEPAR (black dashed), QtotJHU =Confirmed



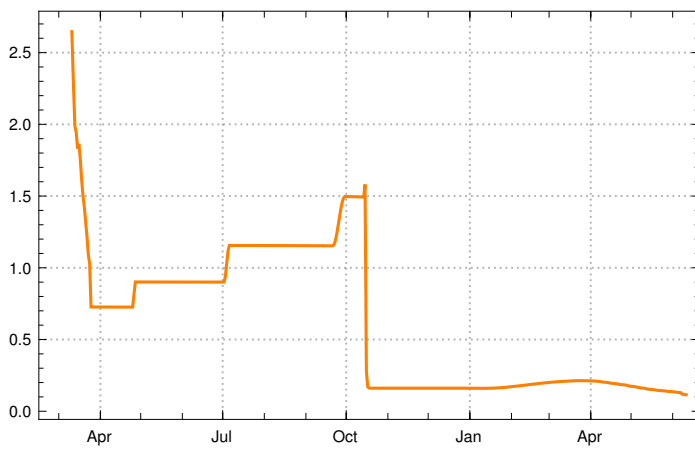
Graph Anew SEPAR (black dotted),



Graph Qtot SEPAR (black dashed), QtotJHU =Confirmed



Graph Qnew SEPAR (black dotted),



Graph Rho-Modell

$$\beta = 1$$

`ln[*]:= Qneurek1a = Qneurek ;`
`RhoMod1a = RhoMod7 ;`

Szenario 1b, Testquote $\beta=80\%$,


```

β = 0.8 (*Testquote*); η = 0.9 (*reliability des Tests*);
l = 1(*erster Tag der Sensibilität des Tests*);
ta = tOct1 + 15 - 1;
xTestA[x_] = Piecewise[{{0, x < ta}, {1, x ≥ ta}}] (*Anschaltfunktion des Tests*);
(*Testzykel={1,0,0,0,0,0,0,0,0};
TestB=Join[Table[0,ta-1],Flatten[Table[η Testzykel ,Floor[ $\frac{kend}{7}$ ]]]]];*)
(*TestB=Join[Table[0,ta-1],Table[η,kend]] *)

```

Take : Nonatomic expression expected at position 1 in Take [TestA , {229 , 249 }].

```

In[ ]:= TestB = Join[Table[0, ta - 1], Table[η, kend]]
(*Definition der Testfrequenz und -effektivität*);
Take[TestB, {ta - 5, ta + 15}]

```

```

Out[ ]:= {0, 0, 0, 0, 0, 0.9, 0.9, 0.9, 0.9, 0.9,
0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9}

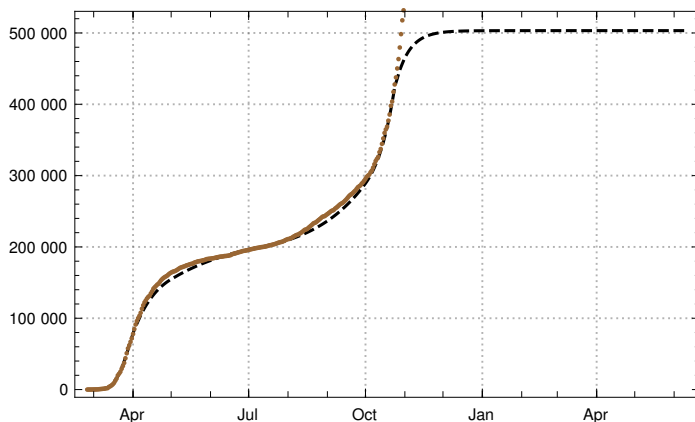
```

Run <SEPAR- recursion-2014-04-17.nb> version (iv)

```

In[ ]:= NotebookEvaluate [
"/home/erhard/Dropbox/Mathematica_notebooks /Corona/0-Standardmoduln /SEPAR-recursion-
Version-iv-2021-05-31.nb"]
a0=1.04078 RMESEQtot = 1.23461 × 106
RMESE Anew= 10 743.

```



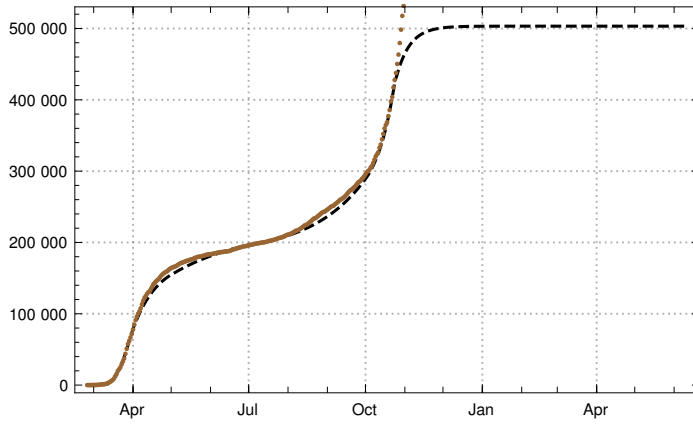
Graph Qtot SEPAR (black dashed), QtotJHU =Confirmed

```

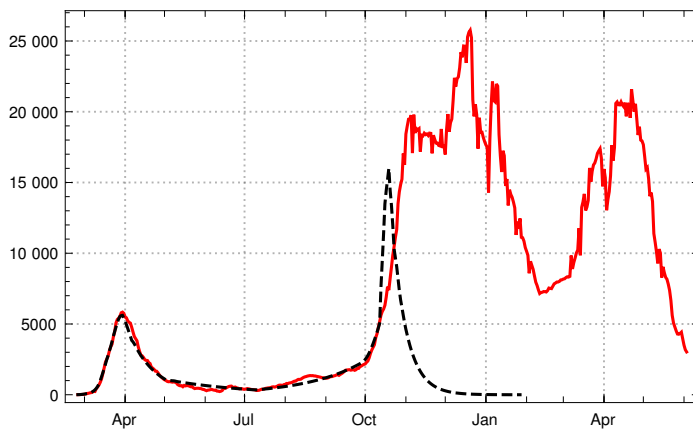
TestB = Join[Table[0, ta - 1], Table[η, kend]]
(*Definition der Testfrequenz und -effektivität *);
Take[TestB, {ta - 5, ta + 15}]

```

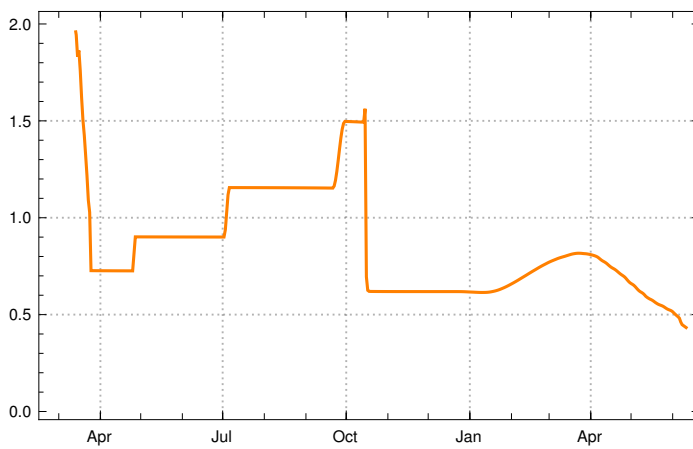
Graph Anew SEPAR (black dotted),

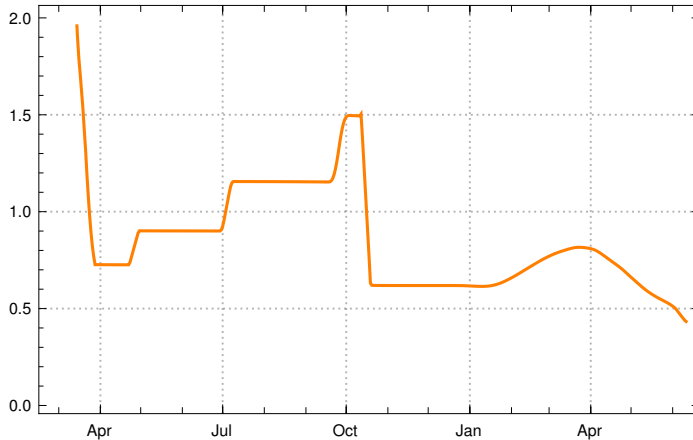


Graph Qtot SEPAR (black dashed), QtotJHU = Confirmed



Graph Qnew SEPAR (black dotted),





Graph Rho-Modell , Rho-Modell -7

$$\beta = 0.8$$

```
In[ ] := Qneurek1b = Qneurek7 ;
RhoMod1b = RhoMod7 ;
```

Szenario 2c, Testquote $\beta=60\%$,

```
In[ ] :=
```

```
 $\beta = 0.6$  (*Testquote*);  $\eta = 0.9$  (*reliability des Tests*);
l = 1(*erster Tag der Sensibilität des Tests*);
ta = tOct1 + 15 - 1;
xTestA[x_] = Piecewise[{{0, x < ta}, {1, x  $\geq$  ta}}] (*Anschaltfunktion des Tests*);
    |stückweise
```

```
Testzykel = {1, 0, 0, 0, 0, 0, 0};
TestB = Join[Table[0, ta - 1], Table[ $\eta$ , kend]]
    |ver... |Tabelle |Tabelle
(*Definition der Testfrequenz und -effektivität*);
    |Definition
Take[TestB, {ta - 5, ta + 15}]
    |entferne
```

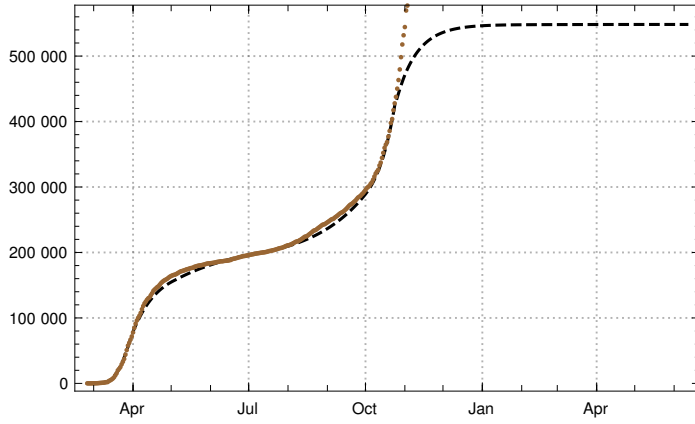
```
Out[ ] := {0, 0, 0, 0, 0, 0.9, 0.9, 0.9, 0.9, 0.9,
0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9, 0.9}
```

Run <SEPAR- recursion-2014-04-17.nb> version (iv)

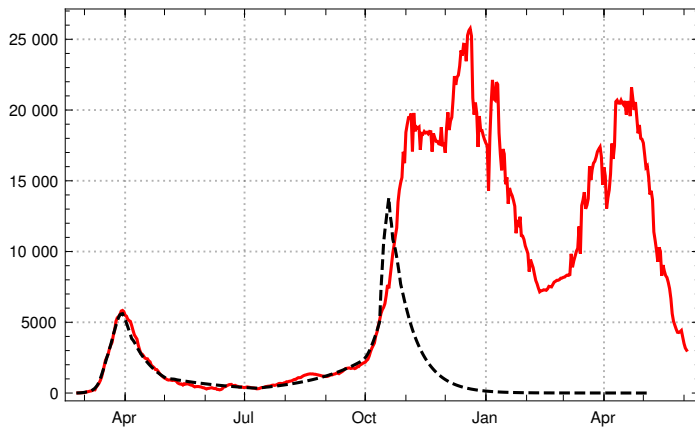
```
NotebookEvaluate ["file-path/SEPAR-recursion-Version-iv-2021-05-31.nb"]
    |werte aus im Notebook
```

$a_0=1.04078$ $RMESE_{Qtot} = 1.20864 \times 10^6$

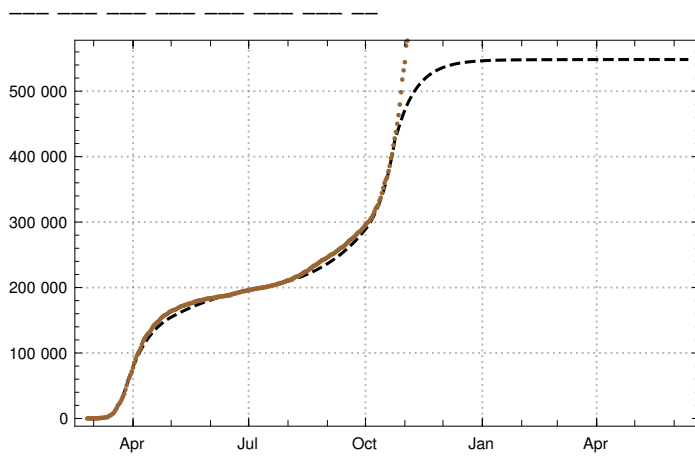
$RMESE_{Anew} = 10\,525.6$



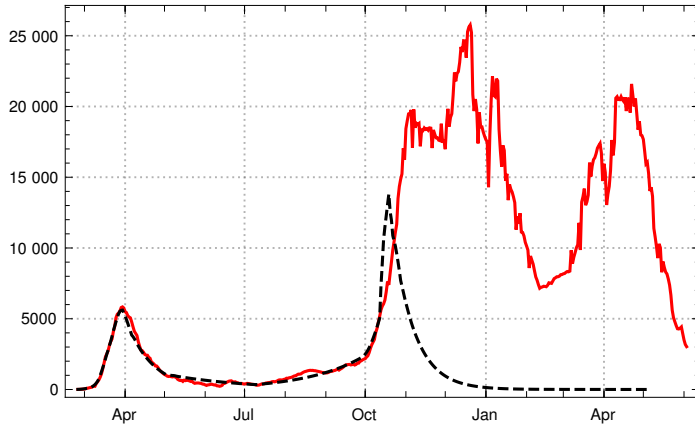
Graph $Qtot$ SEPAR (black dashed), $Qtot_{JHU} = Confirmed$



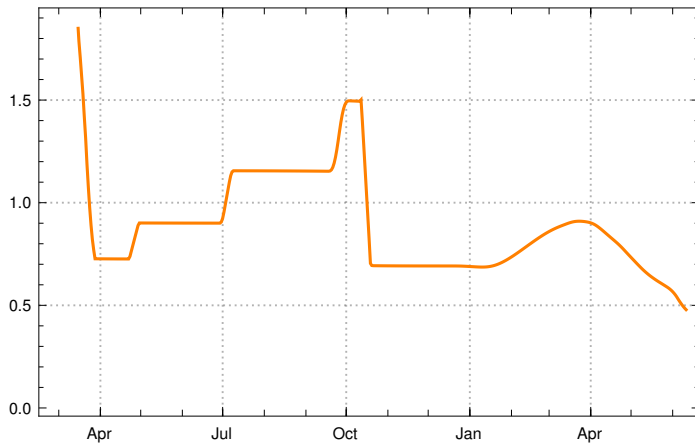
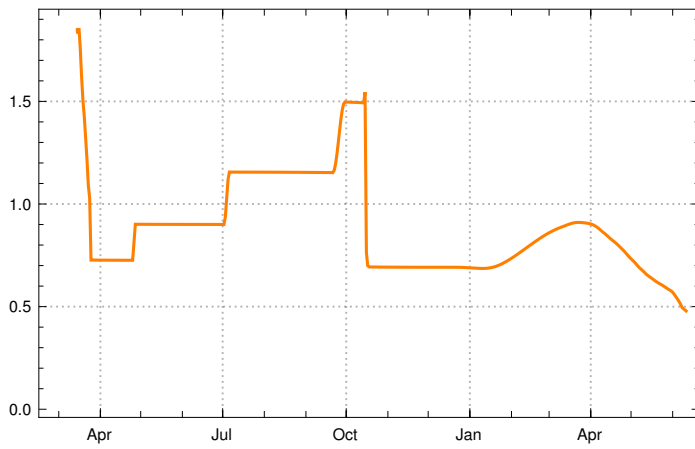
Graph $Anew$ SEPAR (black dotted),



Graph $Qtot$ SEPAR (black dashed), $Qtot_{JHU} = Confirmed$



Graph Qnew SEPAR (black dotted),



Graph Rho-Modell , Rho-Modell -7

$\beta = 0.6$

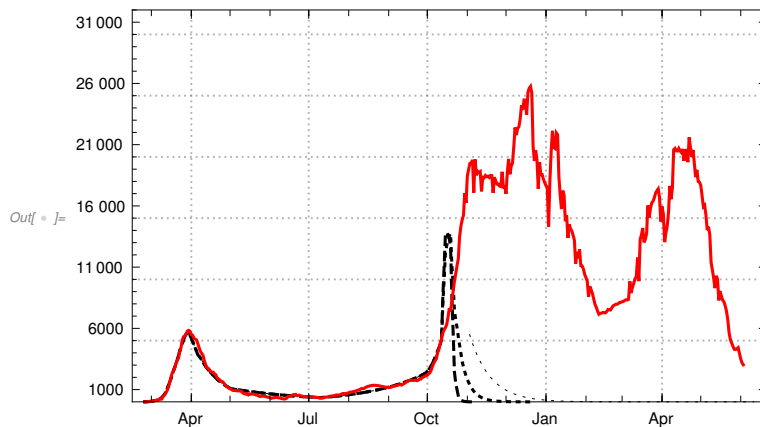
`In[] := Qneurek1c = Qneurek7 ;`

`RhoMod1c = RhoMod7 ;`

```

In[ ]:= GraphQneurek1a = DateListPlot[{Take[Qneurek1a, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {Black, Dashed}, Joined -> True,
    Darstellungsstil schwarz gestrichelt verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium], PlotRange -> {1, 3.2 * 10^4}];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß Koordinatenbereich der Graphik
GraphQneurek1b = DateListPlot[{Take[Qneurek1b, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {Black, Dotted}, Joined -> True,
    Darstellungsstil schwarz punktiert verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium], PlotRange -> {1, 45 * 10^3}];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß Koordinatenbereich der Graphik
GraphQneurek1c = DateListPlot[{Take[Qneurek1c, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {Black, Dotted, Thin}, Joined -> True,
    Darstellungsstil schwarz punktiert dünn verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
Show[GraphQneurek1a, GraphQneurek1b, GraphQneurek1c, GraphQneu7JHU]
    zeige an

```



```

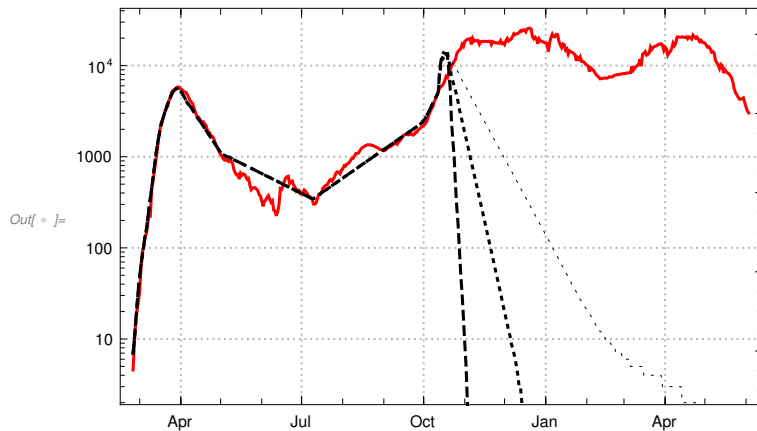
Export["file-path/graph-Qneu-Test-Szen-1a-b-c-2021-04-23.pdf", %]
    exportiere

```

```

In[ ]:= GraphLogQneurek1a = DateListLogPlot [{Take[Qneurek1a , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dashed}, Joined → True ,
      [Darstellungsstil [schwarz [gestrichelt [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium], PlotRange → {1, 1 × 106}}];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß [Koordinatenbereich der Graphik
GraphLogQneurek1b = DateListLogPlot [{Take[Qneurek1b , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dotted}, Joined → True ,
      [Darstellungsstil [schwarz [punktirt [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium]];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß
GraphLogQneurek1c = DateListLogPlot [{Take[Qneurek1c , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dotted , Thin}, Joined → True ,
      [Darstellungsstil [schwarz [punktirt [dünn [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium]];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß
Show[GraphLogQneu7JHU , GraphLogQneurek1a , GraphLogQneurek1b , GraphLogQneurek1c ]
[zeige an

```



```

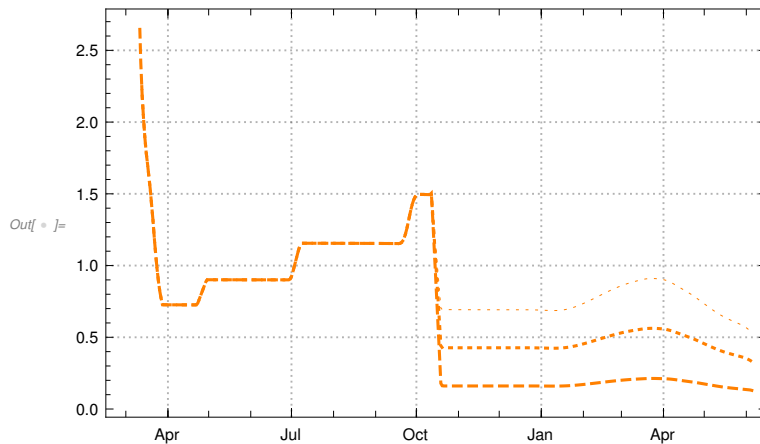
Export["file-path/graph-LogQneu-Test-Szen-1a-b-c-2021-06-07.pdf" , %]
[exportiere

```

```

In[ ]:= GraphRhoMod1a = DateListPlot[{Take[RhoMod1a, {1, Length[QJHU]}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {ColorRho, Dashed}, Joined → True,
    Darstellungsstil gestrichelt verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
GraphRhoMod1b = DateListPlot[{Take[RhoMod1b, {1, Length[QJHU]}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {ColorRho, Dotted}, Joined → True,
    Darstellungsstil punktiert verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
GraphRhoMod1c = DateListPlot[{Take[RhoMod1c, {1, Length[QJHU] - 3}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {ColorRho, Dotted, Thin}, Joined → True,
    Darstellungsstil punktiert dünn verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
Show[GraphRhoMod1a, GraphRhoMod1b, GraphRhoMod1c]
    zeige an

```



```

Export["file-path/graph-RhoMod-Test-Szen-1a-b-c-2021-06-07.pdf", %]
    exportiere

```

Szenario 2 “Antigen”, tägliche Test, $\eta = 0.7$,

Szenario 2a, Testquote $\beta=100\%$, tägliche Tests

In[]:=

```

 $\beta = 1$  (*Testquote*);  $\eta = 0.7$  (*reliability des Tests*);
l = 4(*erster Tag der Sensibilität des Tests*);
ta = tOct1 + 15 - 1;
xTestA[x_] = Piecewise [{{0, x < ta}, {1, x  $\geq$  ta}}] (*Anschaltfunktion des Tests*);
    |stückweise
Testzykel = {1, 0, 0, 1, 0, 0, 0};
TestB = Join[Table[0, ta - 1], Table[ $\eta$ , kend]]
    |ver... |Tabelle |Tabelle
(*Definition der Testfrequenz und -effektivität*);
    |Definition
Take[TestB, {ta - 5, ta + 15}]
    |entferne

```

```

Out[ ]:= {0, 0, 0, 0, 0, 0.7, 0.7, 0.7, 0.7, 0.7,
         0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7}

```

```

-----

```

```

Run <SEPAR- recursion-2014-04-17.nb> version (iv)

```

```

NotebookEvaluate ["/file-path/SEPAR-recursion-Version-iv-2021-05-31.nb"]

```

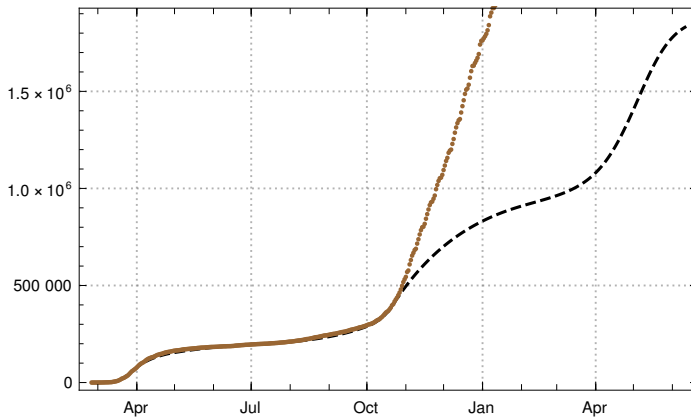
```

    |werte aus im Notebook

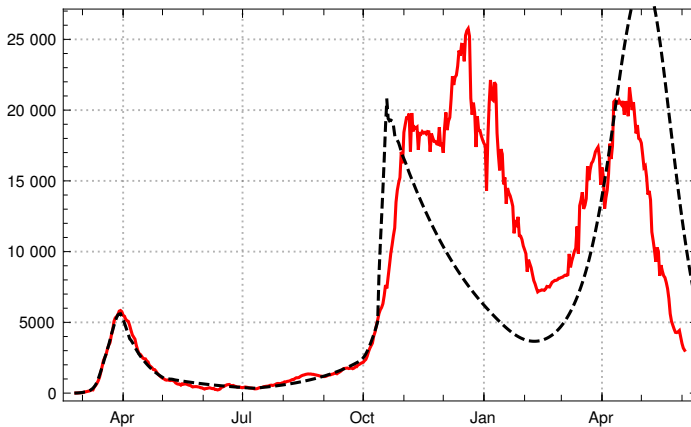
```

a0=1.04078 RMESEQtot = 901621.

RMESE Anew= 6461.11



Graph Qtot SEPAR (black dashed), QtotJHU =Confirmed



Graph Anew SEPAR (black dotted),

In[]:= Qneurek2a = Qneurek ;
 RhoMod2a = RhoMod7 ;

Szenario 2b, Testquote $\beta=80\%$,

In[]:=

```

 $\beta = 0.8$  (*Testquote*);  $\eta = 0.7$  (*reliability des Tests*);
l = 4(*erster Tag der Sensibilität des Tests*);
ta = tOct1 + 15 - 1;
xTestA[x_] = Piecewise [{{0, x < ta}, {1, x  $\geq$  ta}}] (*Anschaltfunktion des Tests*);
    stückweise
(*Testzykel = {1, 0, 0, 0, 0, 0, 0};
TestB=Join[Table[0, ta-1], Flatten[Table[ $\eta$  Testzykel, Floor[ $\frac{kend}{7}$ ]]]] ;*)
    ver... Tabelle ebne ein Tabelle runde ab
(*TestB=Join[Table[0, ta-1], Table[ $\eta$ , kend]] *)
    ver... Tabelle Tabelle
    
```

```

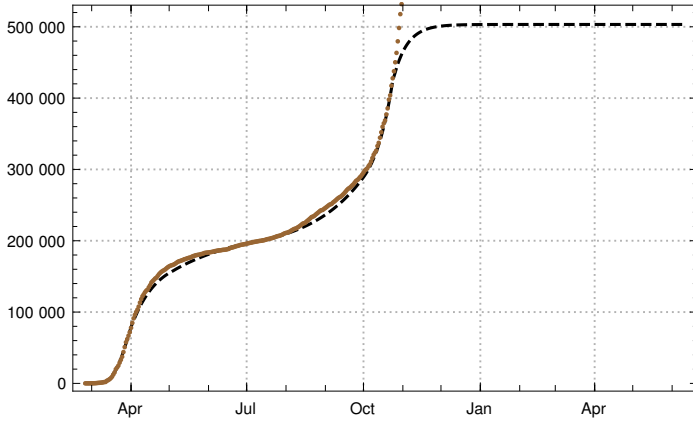
In[ * ]:= TestB = Join[Table[0, ta - 1], Table[η, kend]]
           |ver... |Tabelle           |Tabelle
           |
           (*Definition der Testfrequenz und -effektivität*);
           |Definition
           Take[TestB, {ta - 5, ta + 15}]
           |entferne
Out[ * ]= {0, 0, 0, 0, 0, 0.7, 0.7, 0.7, 0.7, 0.7,
           0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7}

```

 Run <SEPAR- recursion-2014-04-17.nb> version (iv)

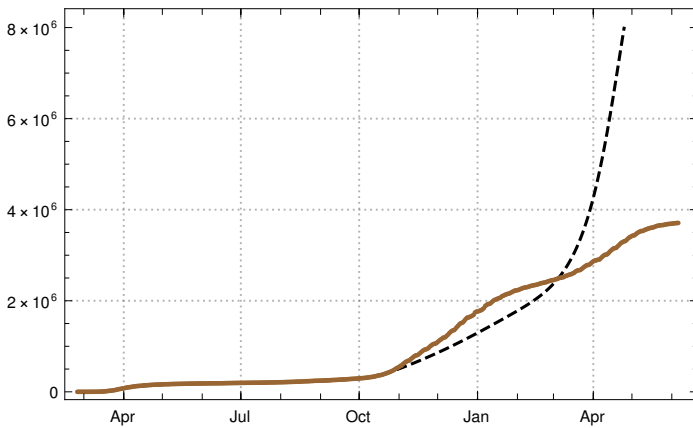
NotebookEvaluate ["/file-path/SEPAR-recursion-Version-iv-2021-05-31.nb"]
 |werte aus im Notebook

$a_0=1.04078$ $RMESE_{Qtot} = 1.23461 \times 10^6$
 $RMESE_{Anew} = 10\,743.$

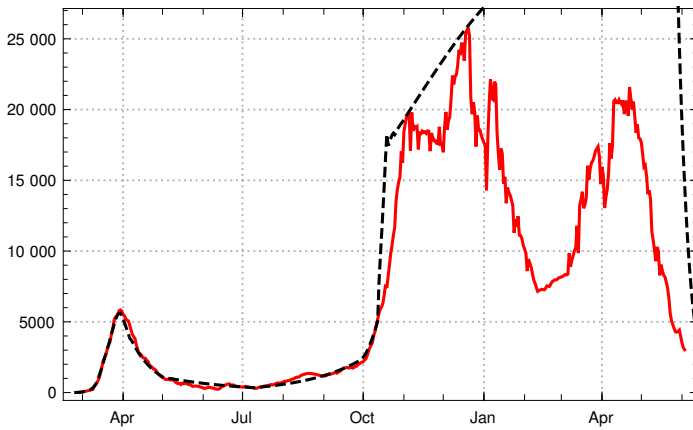


Graph $Qtot$ SEPAR (black dashed), $Qtot_{JHU} = \text{Confirmed}$

$a_0=1.04078$ $RMESE_{Qtot} = 1.51178 \times 10^6$
 $RMESE_{Anew} = 83\,550.$



Graph $Qtot$ SEPAR (black dashed), $Qtot_{JHU} = \text{Confirmed}$



$ln[\text{ }] := Q_{neurek2b} = Q_{neurek7} ;$
 $RhoMod2b = RhoMod7 ;$

 Szenario 2c, Testquote $\beta=60\%$,

In[]:=

```
 $\beta = 0.6$  (*Testquote*);  $\eta = 0.7$  (*reliability des Tests*);
 $l = 4$  (*erster Tag der Sensibilität des Tests*);
 $ta = t0ct1 + 15 - 1$ ;
 $xTestA[x_] = Piecewise[{{0, x < ta}, {1, x \geq ta}}$ ] (*Anschaltfunktion des Tests*);
  stückweise
```

```
Testzykel = {1, 0, 0, 0, 0, 0, 0, 0};
```

```
TestB = Join[Table[0, ta - 1], Table[ $\eta$ , kend]]
```

[ver...](#) [Tabelle](#) [Tabelle](#)

```
(*Definition der Testfrequenz und -effektivität*);
```

[Definition](#)

```
Take[TestB, {ta - 5, ta + 15}]
```

[entferne](#)

Out[]:= {0, 0, 0, 0, 0, 0.7, 0.7, 0.7, 0.7, 0.7,
 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7, 0.7}

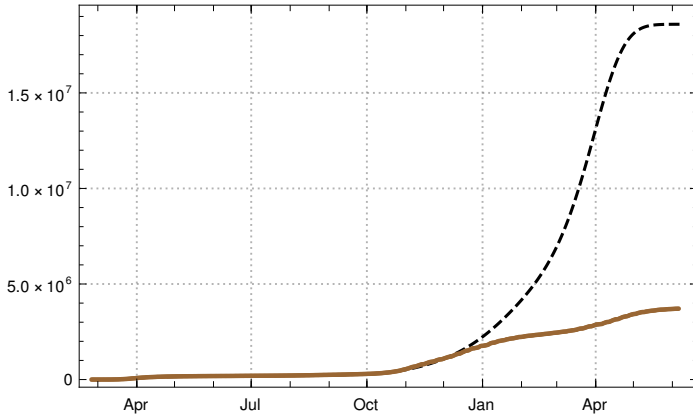
 Run <SEPAR- recursion-2014-04-17.nb> version (iv)

```
NotebookEvaluate ["file-path/SEPAR-recursion-Version-iv-2021-05-31.nb"]
```

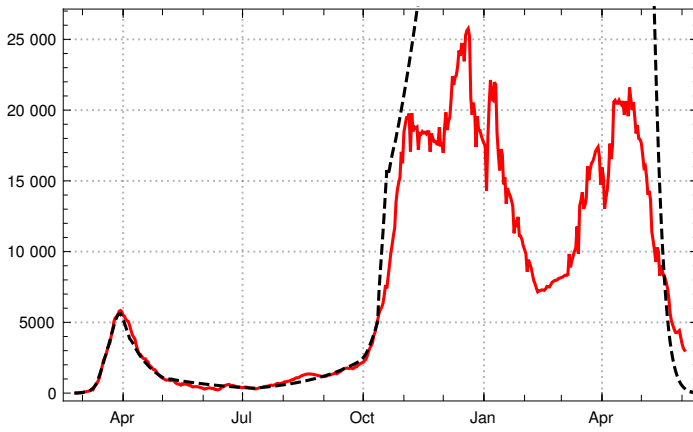
[werte aus im Notebook](#)

$a_0=1.04078$ $RMESE_{Qtot} = 4.80025 \times 10^6$

$RMESE_{Anew} = 115037.$



Graph $Qtot$ SEPAR (black dashed), $Qtot_{JHU} = \text{Confirmed}$



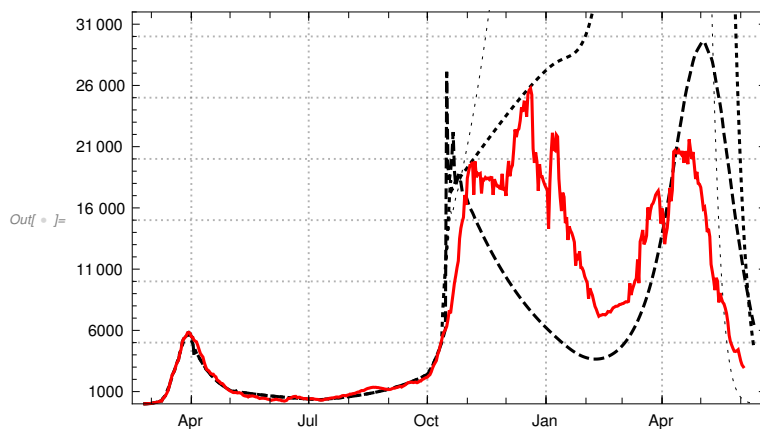
Graph $Anew$ SEPAR (black dotted),

$ln[\cdot] := \text{Qneurek2c} = \text{Qneurek7} ;$
 $\text{RhoMod2c} = \text{RhoMod7} ;$

```

In[ ]:= GraphQneurek2a = DateListPlot[{Take[Qneurek2a, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {Black, Dashed}, Joined → True,
    Darstellungsstil schwarz gestrichelt verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium], PlotRange → {1, 3.2 × 104};
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß Koordinatenbereich der Graphik
GraphQneurek2b = DateListPlot[{Take[Qneurek2b, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {Black, Dotted}, Joined → True,
    Darstellungsstil schwarz punktiert verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium], PlotRange → {1, 45 × 103};
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß Koordinatenbereich der Graphik
GraphQneurek2c = DateListPlot[{Take[Qneurek2c, {1, Length[QJHU] + 5}],
    graphische Darstel... entferne Länge
    datet0, PlotStyle → {Black, Dotted, Thin}, Joined → True,
    Darstellungsstil schwarz punktiert dünn verknüpft? wahr
    Sequence[PlotTheme → "Detailed", ImageSize → Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
Show[GraphQneurek2a, GraphQneurek2b, GraphQneurek2c, GraphQneu7JHU]
zeige an

```



```

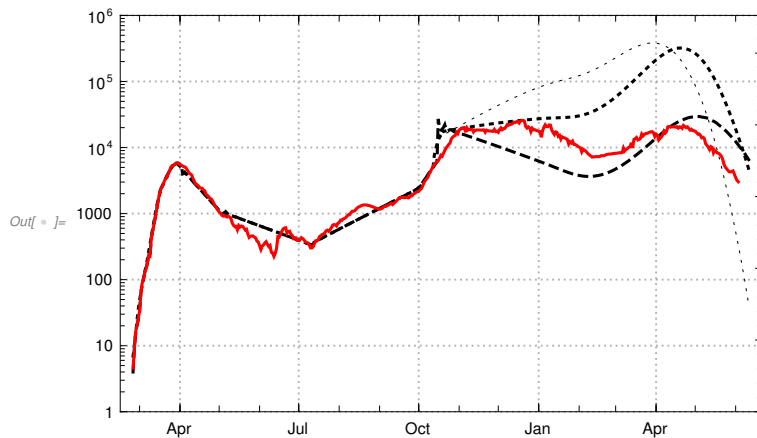
Export["file-path/graph-Qneu-Test-Szen-2a-b-c-2021-06-07.pdf", %]
exportiere

```

```

In[ ]:= GraphLogQneurek2a = DateListLogPlot [{Take[Qneurek2a , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dashed}, Joined → True ,
      [Darstellungsstil [schwarz [gestrichelt [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium], PlotRange → {1, 1 × 106}}];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß [Koordinatenbereich der Graphik
GraphLogQneurek2b = DateListLogPlot [{Take[Qneurek2b , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dotted}, Joined → True ,
      [Darstellungsstil [schwarz [punktirt [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium]];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß
GraphLogQneurek2c = DateListLogPlot [{Take[Qneurek2c , {1, Length[QJHU] + 5}],
      [logarithmische Darstell... [entferne [Länge
      datet0 , PlotStyle → {Black , Dotted , Thin}, Joined → True ,
      [Darstellungsstil [schwarz [punktirt [dünn [verknüpft? [wahr
      Sequence[PlotTheme → "Detailed" , ImageSize → Medium]];
      [Sequenz [Thema der graphischen Darstellung [Bildgröße [mittelgroß
Show[GraphLogQneurek2a , GraphLogQneurek2b , GraphLogQneurek2c , GraphLogQneu7JHU ]
[zeige an

```



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Export["file-path/graph-LogQneu-Test-Szen-2a-b-c-2021-06-07.pdf" , %]
[exportiere

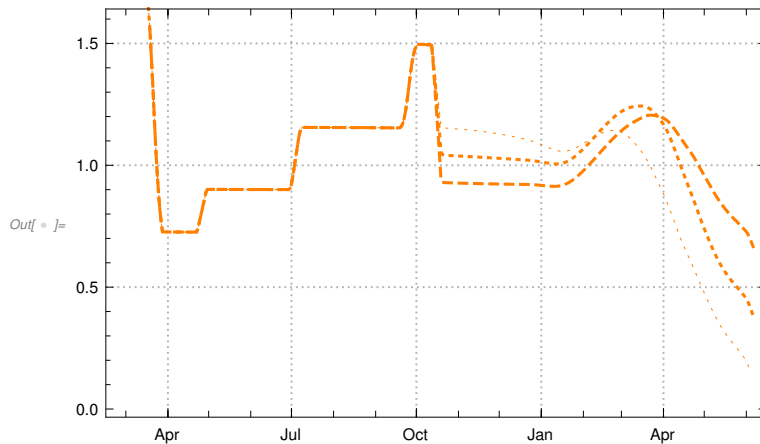
```



```

In[ ]:= GraphRhoMod2a = DateListPlot[{Take[RhoMod2a, {1, Length[QJHU]}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {ColorRho, Dashed}, Joined -> True,
    Darstellungsstil gestrichelt verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
GraphRhoMod2b = DateListPlot[{Take[RhoMod2b, {1, Length[QJHU]}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {ColorRho, Dotted}, Joined -> True,
    Darstellungsstil punktiert verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
GraphRhoMod2c = DateListPlot[{Take[RhoMod2c, {1, Length[QJHU] - 3}]},
    graphische Darstel... entferne Länge
    datet0, PlotStyle -> {ColorRho, Dotted, Thin}, Joined -> True,
    Darstellungsstil punktiert dünn verknüpft? wahr
    Sequence[PlotTheme -> "Detailed", ImageSize -> Medium]];
    Sequenz Thema der graphischen Darstellung Bildgröße mittelgroß
Show[GraphRhoMod2a, GraphRhoMod2b, GraphRhoMod2c]
    zeige an

```



```

Export["file-path/graph-RhoMod-Test-Szen-2a-b-c-2021-06-07.pdf", %]
    exportiere

```