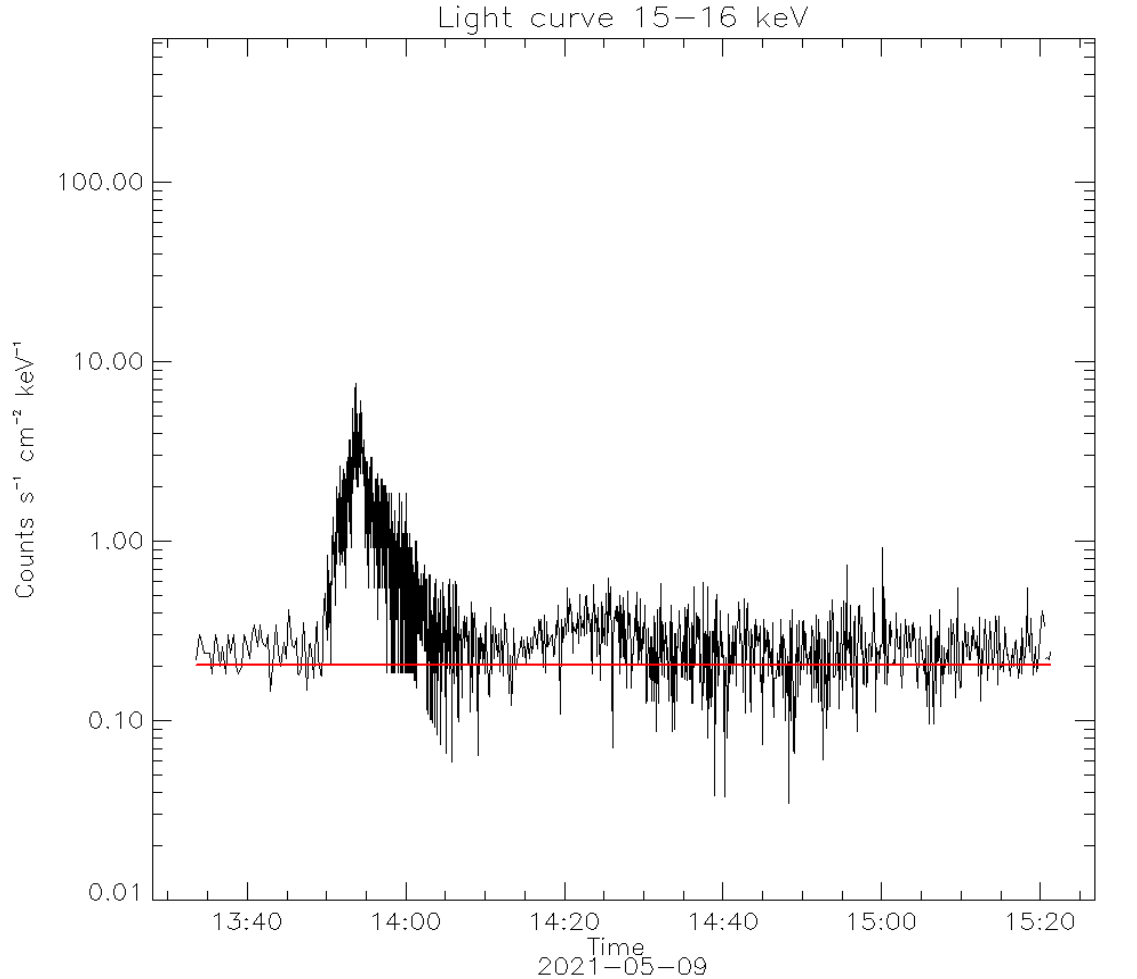
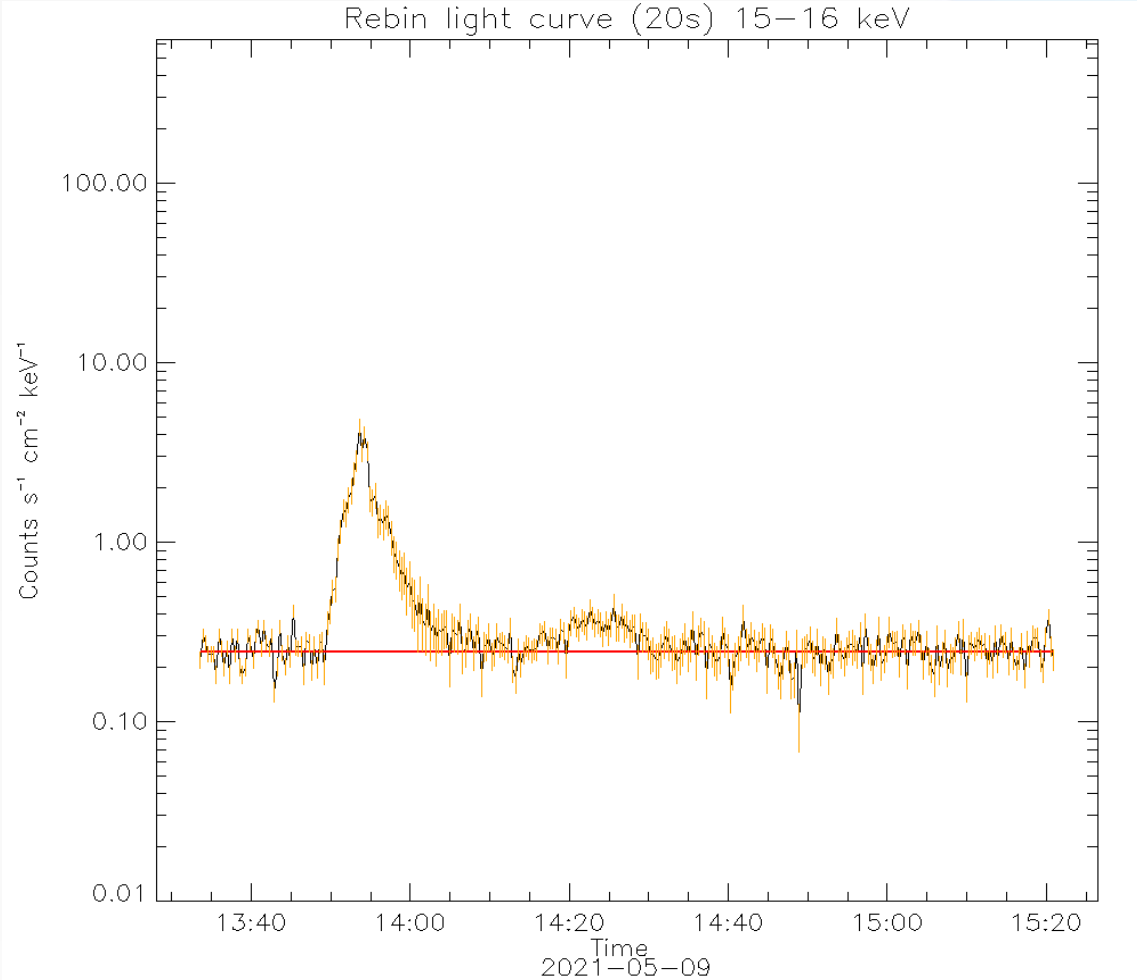
Analiza rozbłysków słonecznych obserwowanych przy użyciu instrumentu STIX

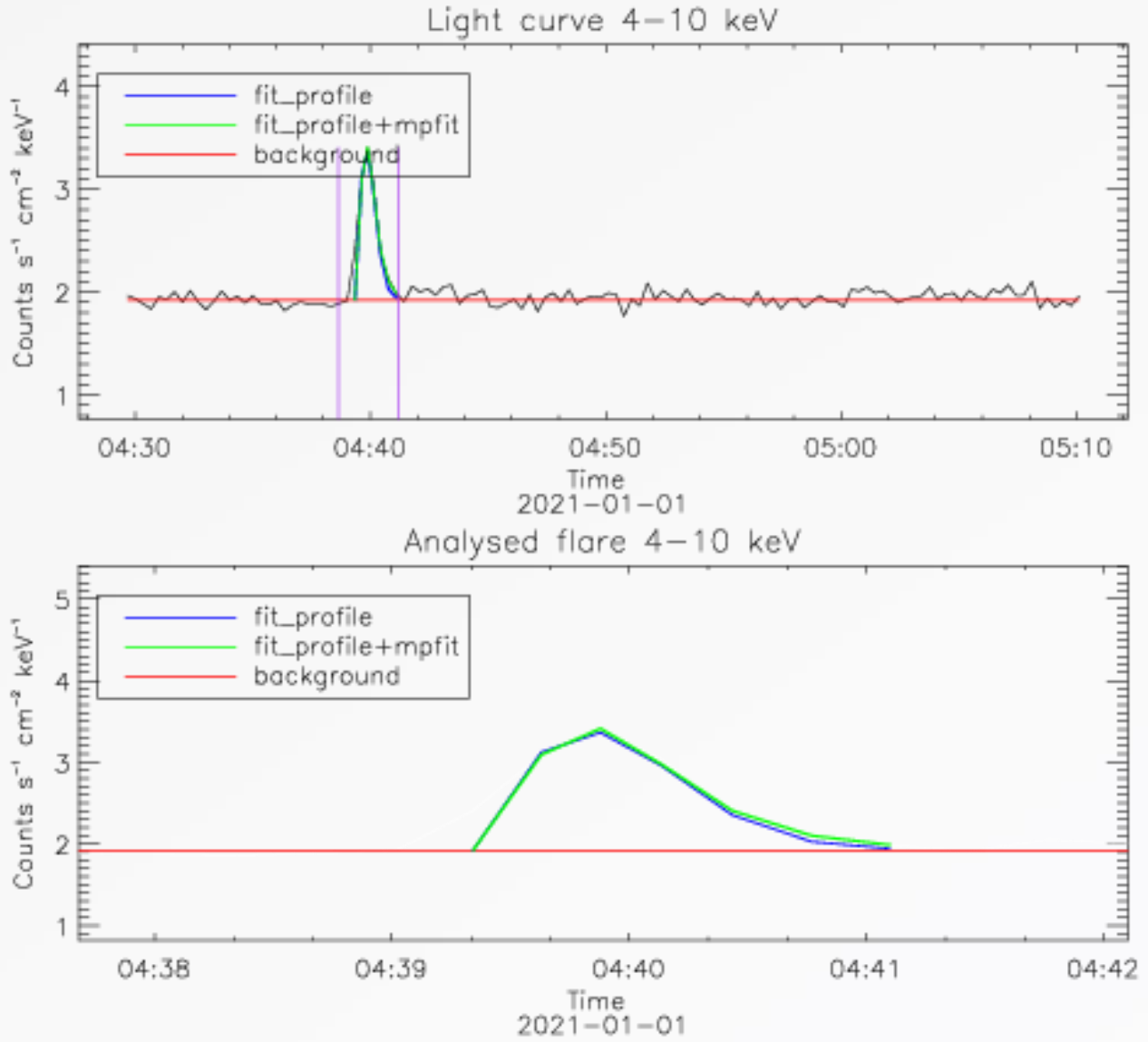
Wykonał
Karol Kułaga

Algorytm wygładzający dane





Algorytm dopasowujący się do krzywej blasku profilem wrocławskim



Skrypt do kodu Palermo-Harvard

1. Steady-state Initial atmosphere

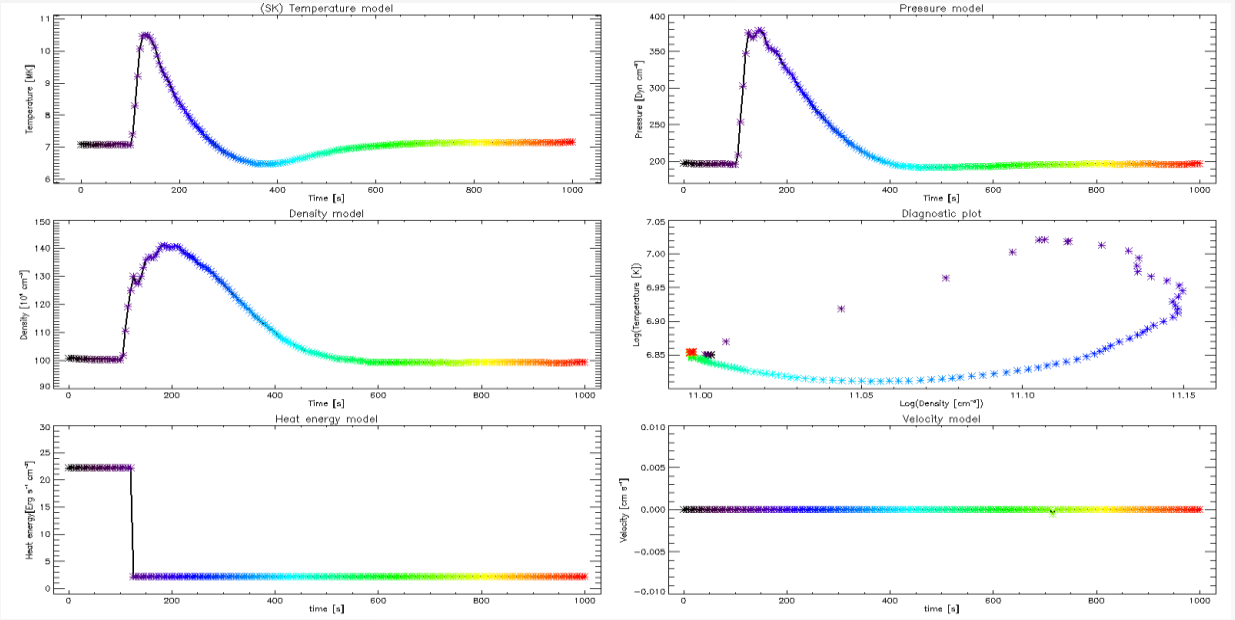
```
cd  STARDY/

change permission, if necessary
chmod u+x stardy.out

compile the program
gfortran *.f

move compiled program a.exe to „standard name”
mv a.exe stardy.out

select parameters of a loop – edit the file input _file

run the program
./stardy.out < input_file
```

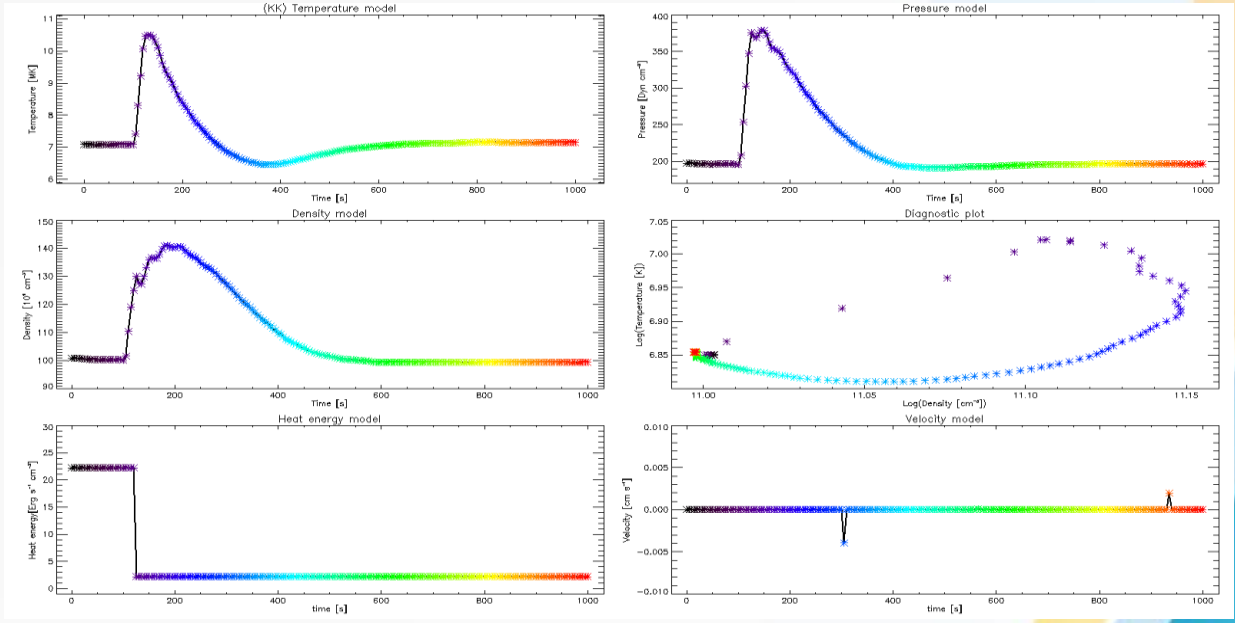
```
cd ..
cd PH/

remove object files ( *.o)
rm *.o

compile the program
make -f makefile

change permission, if necessary
chmod +x standard.com

edit the file standard.com  (parameters of heating function)

make symbolic link to the file with radiative loss function (if necessary)
ln –s ../STARDY/radia.dat

run the program
./standard.com
```

- Porównanie starej metody (z ręczna edycją plików) z wykorzystaniem skryptu
- W skrypcie dodatkowo zawarta jest informacja do sposobu wywołania programu

```
laptop@Karol ~
$ sh ./scriptPH.sh -h

   points      = value   Number of output grid points; optional value = 500
   press       = value   Pressure [Dyn/cm^2]; optional value = 6.
   heat        = value   Heat at the beginning [Erg/s/cm^2]; optional value = 0.135131E-01
   lenght      = value   Half lenght of loop [cm]; optional value = 2.e9
   conv        = value   frac.conv.fact; optional value = .01
   q           = value   Change in grid [1.11 EQ 11%]; optional value = 1.11
   near        = value   Points number in transition region; optional value = 10
   ql          = value   Change in grid in Chromosphere; optional value = 1.11
   qr          = value   Change in grid in Corona; optional value = 1.09
   dxm         = value   Lowest size of cell (Step betweeen points [cm]); optional value = 3000.
   dxgr        = value   Biggest size of cell (Step betweeen points [cm]); optional value = 1.E+4
   fact        = value   Threshold which decided about changing the grid; optional value = .1
   funct       = value   Choice of the heating space function (0 for Gaussian); optional value = 0
   heating     = value   Flare heating; optional value = 10.
   ton         = value   Time after heat is turning on; optional value = 0.
   toff        = value   Time after heat is turning off; optional value = 50.
   tout        = value   Time bin for saving data; optional value = 5.
   tend        = value   Time range in seconds; optional value = 300.01
   heatcen     = value   Position where occure heat; optional value = lenght of loop
   width       = value   Width of heat area; optional value = 1/10 of lenght of loop
   decay       = value   Heating decay time (tau); optional value = 0.
   timesav     = value   Saving all points (1) or only with bin tout (0); optional value = 0
   timeini     = value   Initial time step; optional value = 0.001

   precursor   = value   Possibility of adding precursor in flare (1-include, 0-skip); optional value = 0
   functprec   = value   Precursor choice of the heating space function (0 for Gaussian); optional value = 0
   heatingprec = value   Precursor flare heating; optional value = 10.
   tonprec     = value   Precursor time after heat is turning on; optional value = 0.
   toffprec    = value   Precursor time after heat is turning off; optional value = 50.
   toutprec    = value   Precursor time bin for saving data; optional value = 5.
   tendprec    = value   Precursor time range in seconds; optional value = 300.01
   heatcenprec = value   Precursor position where occure heat; optional value = lenght of loop
   widthprec   = value   Precursor width of heat area; optional value = 1/10 of lenght of loop
   decayprec   = value   Precursor heating decay time (tau); optional value = 0.
   timeiniprec = value   Precursor initial time step; optional value = 0.001


laptop@Karol ~
$ sh ./scriptPH.sh press=200. heat=2.2100e0 lenght=0.727e9 conv=0.02 heating=20.0e0 ton=100. toff=120. tend=1000.01 heatcen=0.3e9 width=0.145e9 decay=10.
```

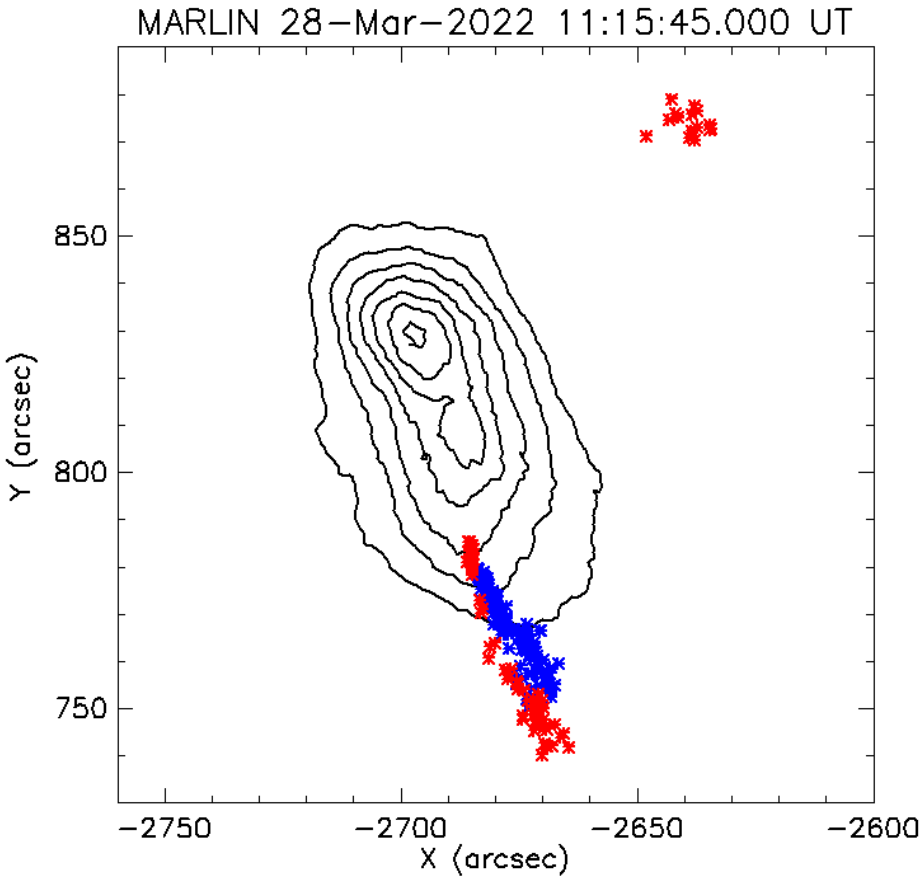
Modele rozbłysków





- Porównanie wyników przy użyciu standardowej metody (lewa strona) oraz skryptu (prawa strona)

Algorytm do mapowania położeń stóp rozbłysków w funkcji energii



Lista zjawisk z 20-21 września 2021

September2021.txt — Notatnik

Plik Edycja Format Widok Pomoc

#DATE	#PIX DATA	#SPECTRUM	#PIC_BEFORE	#PIC_AFTER	#Maximum of 4-10 keV	#Maximum of 10-15 keV
sol2021-09-20T19:04:59-19:13:23	solo_L1A_stix-sci-xray-l1-2109200026_20210920T185954-20210920T191102_014605_V01.fits	-	-	-	671	83
sol2021-09-20T19:20:43-19:29:11	solo_L1A_stix-sci-xray-l1-2109200027_20210920T191502-20210920T192853_014606_V01.fits	-	-	-	1343	167
sol2021-09-20T19:39:47-19:42:35	solo_L1A_stix-sci-xray-l1-2109200038_20210920T193530-20210920T194047_021256_V01.fits	-	-	-	735	231
sol2021-09-20T20:42:43-20:45:51	solo_L1A_stix-sci-xray-l1-2109200044_20210920T203725-20210920T204530_014984_V01.fits	solo_L1A_stix-sci-spectrogram-2109200036_20210920T202925-20210920T203314_032871_V01.fits	-	-	863	151
sol2021-09-20T21:38:31-21:47:23	solo_L1A_stix-sci-xray-l1-2109200046_20210920T213341-20210920T214514_015060_V01.fits	solo_L1A_stix-sci-spectrogram-2109200036_20210920T202925-20210920T203314_032871_V01.fits	-	-	2175	367
sol2021-09-20T23:09:11-23:18:35	solo_L1A_stix-sci-xray-l1-2109200047_20210920T230430-20210920T231800_015061_V01.fits	solo_L1A_stix-sci-spectrogram-2109200037_20210920T221648-20210920T232440_032870_V01.fits	-	-	991	135
sol2021-09-21T03:52:48-04:00:16	solo_L1A_stix-sci-xray-l1-2109210065_20210921T035212-20210921T040216_014615_V01.fits	solo_L1A_stix-sci-spectrogram-2109210083_20210921T032220-20210921T032659_032869_V01.fits	-	-	399	123
sol2021-09-21T04:23:48-04:28:24	solo_L1A_stix-sci-xray-l1-2109210067_20210921T042226-20210921T043054_014617_V01.fits	solo_L1A_stix-sci-spectrogram-2109210083_20210921T032220-20210921T032659_032869_V01.fits	-	-	607	107
sol2021-09-21T04:59:48-05:08:32	solo_L1A_stix-sci-xray-l1-2109210069_20210921T045848-20210921T051011_014619_V01.fits	solo_L1A_stix-sci-spectrogram-2109210084_20210921T045628-20210921T063822_032868_V01.fits	-	-	863	99
sol2021-09-21T05:17:00-05:32:08	solo_L1A_stix-sci-xray-l1-2109210070_20210921T051031-20210921T053615_014620_V01.fits	solo_L1A_stix-sci-spectrogram-2109210084_20210921T045628-20210921T063822_032868_V01.fits	-	-	863	151
sol2021-09-21T06:21:32-06:23:12	solo_L1A_stix-sci-xray-l1-2109210111_20210921T062115-20210921T062402_015100_V01.fits	solo_L1A_stix-sci-spectrogram-2109210084_20210921T045628-20210921T063822_032868_V01.fits	-	-	607	215
sol2021-09-21T09:44:50-09:49:50	solo_L1A_stix-sci-xray-l1-2109210116_20210921T093402-20210921T100606_027042_V01.fits	solo_L1A_stix-sci-spectrogram-2109210086_20210921T080754-20210921T081437_032866_V01.fits	-	-	495	167
sol2021-09-21T09:52:34-09:57:42	solo_L1A_stix-sci-xray-l1-2109210116_20210921T093402-20210921T100606_027042_V01.fits	solo_L1A_stix-sci-spectrogram-2109210086_20210921T080754-20210921T081437_032866_V01.fits	-	-	543	83
sol2021-09-21T10:05:58-10:09:18	solo_L1A_stix-sci-xray-l1-2109210109_20210921T100548-20210921T102120_017846_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	543	83
sol2021-09-21T10:35:18-10:38:54	solo_L1A_stix-sci-xray-l1-2109210073_20210921T102540-20210921T110240_014623_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	543	75
sol2021-09-21T10:46:18-10:48:38	solo_L1A_stix-sci-xray-l1-2109210073_20210921T102540-20210921T110240_014623_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	543	75
sol2021-09-21T11:08:54-11:15:54	solo_L1A_stix-sci-xray-l1-2109210110_20210921T110320-20210921T111430_017847_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	1983	215
sol2021-09-21T12:24:06-12:30:34	solo_L1A_stix-sci-xray-l1-2109210076_20210921T121402-20210921T125126_014626_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	367	67
sol2021-09-21T12:32:18-12:43:06	solo_L1A_stix-sci-xray-l1-2109210076_20210921T121402-20210921T125126_014626_V01.fits	solo_L1A_stix-sci-spectrogram-2109210087_20210921T095930-20210921T112050_032865_V01.fits	-	-	863	99
sol2021-09-21T18:10:02-18:12:50	solo_L1A_stix-sci-xray-l1-2109210080_20210921T180550-20210921T181851_014630_V01.fits	solo_L1A_stix-sci-spectrogram-2109210090_20210921T164507-20210921T165153_032862_V01.fits	-	-	543	107
sol2021-09-21T18:15:06-18:17:34	solo_L1A_stix-sci-xray-l1-2109210080_20210921T180550-20210921T181851_014630_V01.fits	solo_L1A_stix-sci-spectrogram-2109210090_20210921T164507-20210921T165153_032862_V01.fits	-	-	607	99
sol2021-09-21T20:19:50-20:29:30	solo_L1A_stix-sci-xray-l1-2109210115_20210921T201518-20210921T202802_015104_V01.fits	solo_L1A_stix-sci-spectrogram-2109210091_20210921T185627-20210921T203442_032861_V01.fits	-	-	1983	303