

XML Model definitions for Likelihood

Here are example model definitions for Likelihood. Descriptions of the spectral models are described in the [Workbook](#). See the [Likelihood tutorial](#). An [xml file](#) containing these examples is attached.

PowerLaw

```
<source name="PowerLaw_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum type="PowerLaw">
    <parameter free="1" max="1000.0" min="0.001" name="Prefactor" scale="1e-09" value="1"/>
    <parameter free="1" max="-1.0" min="-5." name="Index" scale="1.0" value="-2.1"/>
    <parameter free="0" max="2000.0" min="30.0" name="Scale" scale="1.0" value="100.0"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```

BrokenPowerLaw

```
<source name="BrokenPowerLaw_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum type="BrokenPowerLaw">
    <parameter free="1" max="1000.0" min="0.001" name="Prefactor" scale="1e-09" value="1"/>
    <parameter free="1" max="-1.0" min="-5." name="Index1" scale="1.0" value="-1.8"/>
    <parameter free="1" max="2000.0" min="30.0" name="BreakValue" scale="1.0" value="1000.0"/>
    <parameter free="1" max="-1.0" min="-5." name="Index2" scale="1.0" value="-2.3"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```

PowerLaw2

```
<source name="PowerLaw2_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum type="PowerLaw2">
    <parameter free="1" max="1000.0" min="1e-05" name="Integral" scale="1e-06" value="1.0"/>
    <parameter free="1" max="-1.0" min="-5.0" name="Index" scale="1.0" value="-2.0"/>
    <parameter free="0" max="200000.0" min="20.0" name="LowerLimit" scale="1.0" value="20.0"/>
    <parameter free="0" max="200000.0" min="20.0" name="UpperLimit" scale="1.0" value="2e5"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```

BrokenPowerLaw2

```
<source name="BrokenPowerLaw2_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="BrokenPowerLaw2">
  <parameter free="1" max="1000.0" min="0.001" name="Integral" scale="1e-04" value="1.0"/>
  <parameter free="1" max="-1.0" min="-5.0" name="Index1" scale="1.0" value="-1.8"/>
  <parameter free="1" max="-1.0" min="-5.0" name="Index2" scale="1.0" value="-2.3"/>
  <parameter free="1" max="10000.0" min="30.0" name="BreakValue" scale="1.0" value="1000.0"/>
  <parameter free="0" max="200000.0" min="20.0" name="LowerLimit" scale="1.0" value="20.0"/>
  <parameter free="0" max="200000.0" min="20.0" name="UpperLimit" scale="1.0" value="2e5"/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

LogParabola

```
<source name="LogParabola_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="LogParabola">
  <parameter free="1" max="1000.0" min="0.001" name="norm" scale="1e-9" value="1"/>
  <parameter free="1" max="10" min="0" name="alpha" scale="1.0" value="1"/>
  <parameter free="1" max="1e4" min="20" name="Eb" scale="1" value="300."/>
  <parameter free="1" max="10" min="0" name="beta" scale="1.0" value="2"/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

ExpCutoff

```
<source name="ExpCutoff_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="ExpCutoff">
  <parameter free="1" max="100000.0" min="0.01" name="Prefactor" scale="1e-09" value="50"/>
  <parameter free="1" max="-1.0" min="-5." name="Index" scale="1.0" value="-2.1"/>
  <parameter free="0" max="2000.0" min="30.0" name="Scale" scale="1.0" value="100.0"/>
  <parameter free="1" max="300.0" min="1.0" name="Ebreak" scale="1.0" value="10.0"/>
  <parameter free="1" max="300.0" min="0.1" name="P1" scale="1000.0" value="100."/>
  <parameter free="0" max="1.0" min="-1.0" name="P2" scale="1.0" value="0"/>
  <parameter free="0" max="1.0" min="-1.0" name="P3" scale="1.0" value="0"/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

BPLExpCutoff

```
<source name="BPLExpCutoff_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="BPLExpCutoff">
  <parameter free="1" max="100000.0" min="0.01" name="Prefactor" scale="1e-09" value="1"/>
  <parameter free="1" max="-1.001" min="-5." name="Index1" scale="1.0" value="-2.1"/>
  <parameter free="1" max="-1.001" min="-5." name="Index2" scale="1.0" value="-2.1"/>
  <parameter free="1" max="10000.0" min="1.0" name="BreakValue" scale="1.0" value="1000.0"/>
  <parameter free="1" max="300.0" min="1.0" name="Eabs" scale="1.0" value="10.0"/>
  <parameter free="1" max="300.0" min="0.1" name="P1" scale="1000.0" value="100."/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

Gaussian

```
<source name="Gaussian_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="Gaussian">
  <parameter free="1" max="1000.0" min="0.001" name="Prefactor" scale="1e-09" value="1"/>
  <parameter free="1" max="1e5" min="1e3" name="Mean" scale="1.0" value="7e4"/>
  <parameter free="1" max="30" min="1e4" name="Sigma" scale="1.0" value="1e3"/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

ConstantValue

```
<source name="ConstantValue_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
<spectrum type="ConstantValue">
  <parameter free="0" max="10" min="0" name="Value" scale="1" value="1"/>
</spectrum>
<spatialModel type="SkyDirFunction">
  <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
  <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
</spatialModel>
</source>
```

FileFunction

```
<source name="FileFunction_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum file="foo.dat" type="FileFunction">
    <parameter free="1" max="1e5" min="1e-5" name="Normalization" scale="1" value="1.0"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```

BandFunction

```
<source name="BandFunction_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum type="BandFunction">
    <parameter free="1" max="1000.0" min="1e-05" name="norm" scale="1e-09" value="1.0"/>
    <parameter free="1" max="-1.0" min="-5.0" name="alpha" scale="1.0" value="-1.8"/>
    <parameter free="1" max="-1.0" min="-5.0" name="beta" scale="1.0" value="-2.5"/>
    <parameter free="1" max="-1.0" min="-5.0" name="Ep" scale="1." value="0.1"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```

PLSuperExpCutoff

```
<source name="PLSuperExpCutoff_source" type="PointSource">
<!-- point source units are cm^-2 s^-1 MeV^-1 -->
  <spectrum type="PLSuperExpCutoff">
    <parameter free="1" max="1000" min="1e-05" name="Prefactor" scale="1e-07" value="1"/>
    <parameter free="1" max="0" min="-5" name="Index1" scale="1" value="-1.7"/>
    <parameter free="0" max="1000" min="50" name="Scale" scale="1" value="200"/>
    <parameter free="1" max="30000" min="500" name="Cutoff" scale="1" value="3000"/>
    <parameter free="1" max="5" min="0" name="Index2" scale="1" value="1.5"/>
  </spectrum>
  <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360." min="-360." name="RA" scale="1.0" value="83.45"/>
    <parameter free="0" max="90." min="-90." name="DEC" scale="1.0" value="21.72"/>
  </spatialModel>
</source>
```