Representing the Continuous Spectrum of Visible Light: pst-spectrum

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1 Representing the Visible Spectrum of Light in Different Color Spaces

To represent the spectrum of light decomposition, we have several packages at our disposal with PSTricks: pst-spectra by Arnaud Schmittbuhl, xcolor by Uwe Kern, and a pstricks-add command. [3, 2, 4] All of them use the same source: a Fortran code by Dan Bruton transposed into PostScript or TEX. [1] I have provided a version here: extended visible spectrum. However, it is possible to obtain the representation of the spectrum directly from the data of the International Commission on Illumination (CIE), and we have the choice between the data of (CIE 1931) and that of (CIE 1964). Then we must choose a color space, sRGB, Adobe, etc., which each gives a significantly different representation. However, it is highly unreasonable to expect to reproduce a spectrum obtained by an experimental method, since the various color spaces use illuminant D65, which has a nearest color temperature of approximately 6500 K and corresponds to typical global solar radiation on overcast days. Experimentally, one would prefer to choose uncloudy weather, so another illuminant would need to be defined, and according to Robert Sève: »Temperatures lower than 6500 K will be chosen to account for greater direct solar radiation [...].« One can also attempt to model the values of R, G, and B from the chosen working space; this is certainly what Dan Bruton did, and we will see this in the second part. [1]

2 Representations obtained with the pst-spectrum package

Theoretically, the spectrum can be represented for all wavelengths between 360 nm and 830 nm.

The \psCIEspectrum command has the following options taken from the pst-spectra package written by Arnaud Schmittbuhl. [3]

The two macros

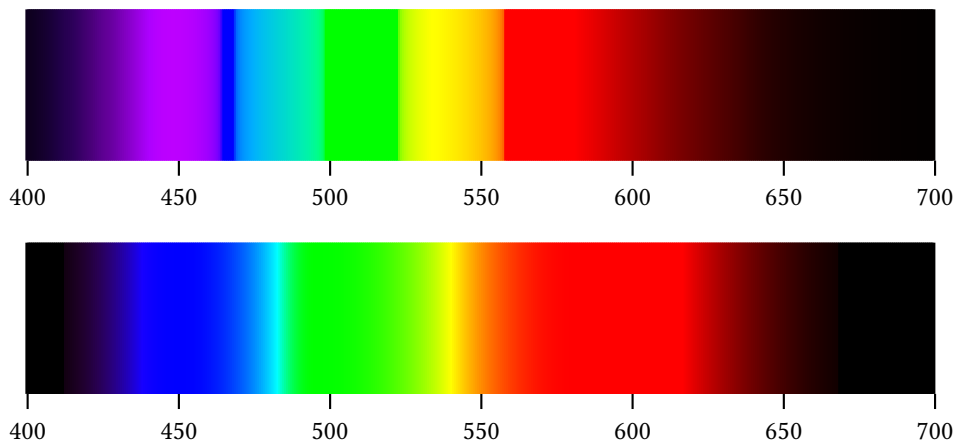
```
\psCIEspectrum[options](x0,y0)(x1,y1)
\psCIEspectrumDB[options](x0,y0)(x1,y1)
```

The coordinates are optional and preset to (-6,-1)(6,1)

Default image with default coordinates

```
\psCIEspectrum[invers=false]

\psCIEspectrumDB[invers=false]
```



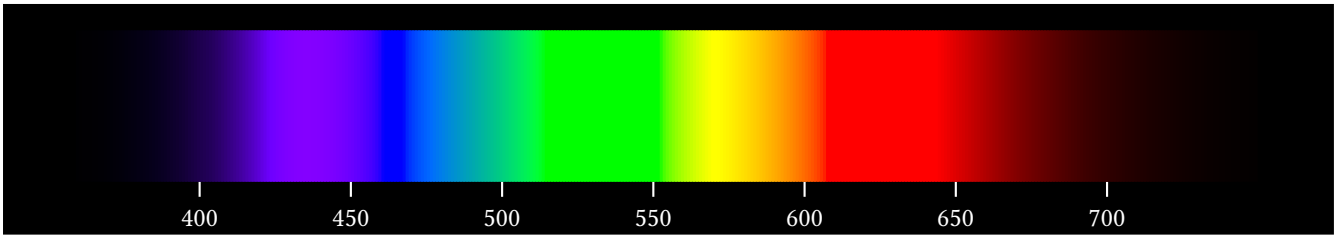
Option	Type	Default	Description
begin	value	360	Initial wavelength, in nm
end	value	830	Final wavelength, in nm
gamma	value	2.2	Color correction
ColorSpace	name	sRGB	Color space
datas	name	CIE1931	CIE data
invers	bool	true	black backgound
values	bool	true	print wavelength

The available color spaces are: Adobe, CIE, ColorMatch, NTSC, Pal-Secam, ProPhoto, SMPTE, and sRGB. The available tabulated values are those of CIE XYZ 1931 and CIE XYZ 1964.

The coordinate pair following the command determines the frame of the spectrum plot. By default, if the coordinates are omitted, the output is: \psCIEspectrum(-5,0)(5,1). Dan Bruton's model is drawn using the command \psspectrumDB. Here are some examples; note the differences depending on whether CIE 1931 or CIE 1964 data is used.

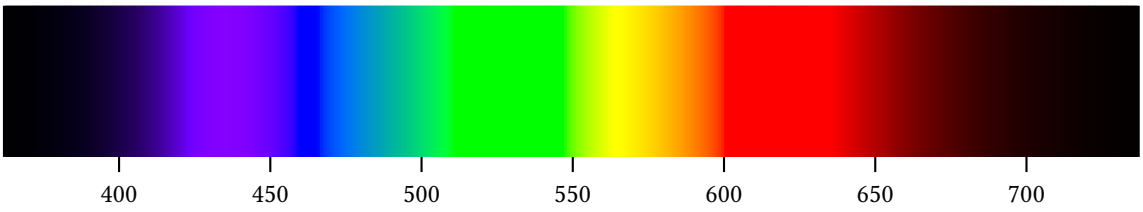
Default image with invers background

```
\psCIEspectrum[gamma=1,begin=360,end=750](-7.6,-1)(8,1)
```



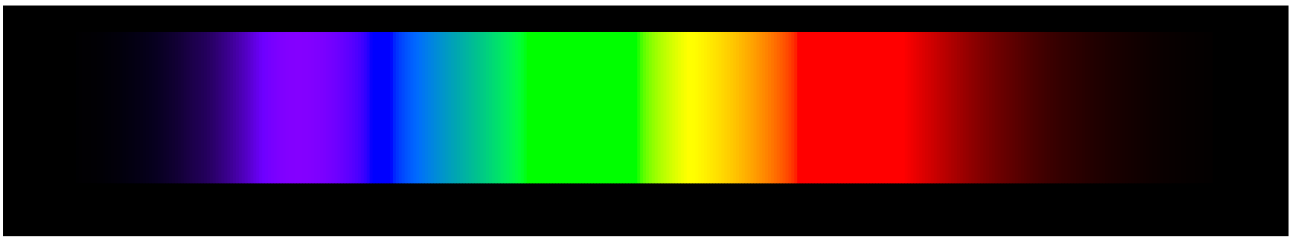
Default image with white background

```
\psCIEspectrum[gamma=1,begin=360,end=750,invers=false](-7.5,-1)(7.5,1)
```



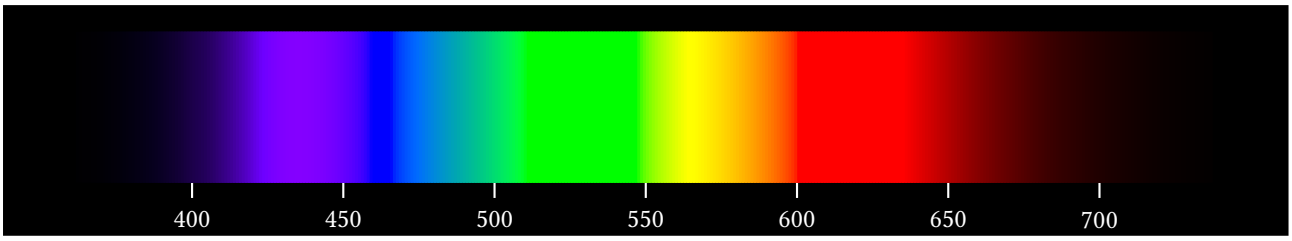
Default image without values

```
\psCIEspectrum[gamma=1,begin=360,end=750,values=false](-7.5,-1)(7.5,1)
```



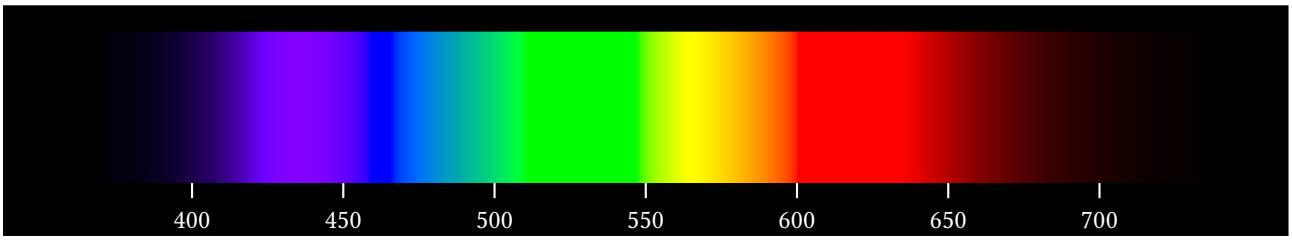
datas=CIE1964

```
\psCIEspectrum[gamma=1,begin=360,end=750,datas=CIE1964](-7.5,-1)(7.5,1)
```



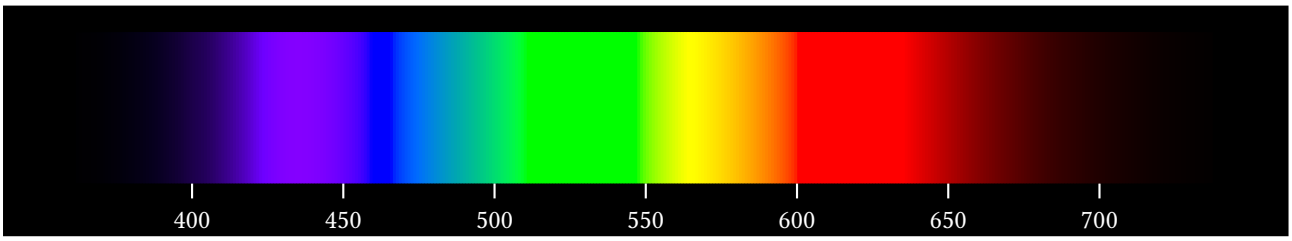
datas=CIE1964, ColorSpace=sRGB

```
\psCIEspectrum[gamma=1,begin=360,end=750,datas=CIE1964](-7.5,-1)(7.5,1)
```



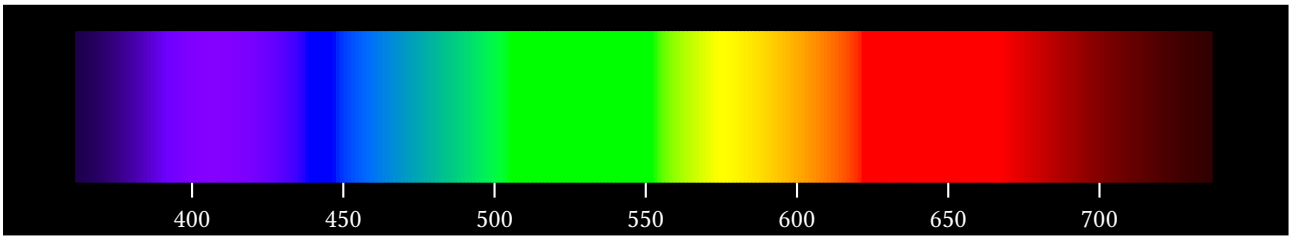
other begin/end values

```
\psCIEspectrum[gamma=1,begin=360,end=750,datas=CIE1964](-7.5,-1)(7.5,1)
```



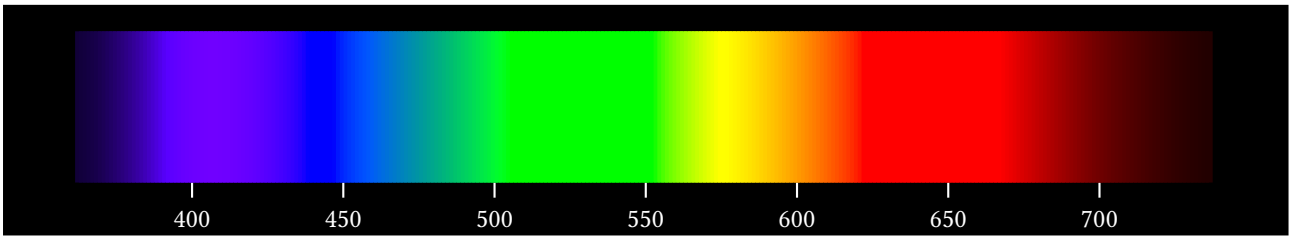
ColorSpace=sRGB

```
\psCIEspectrum[gamma=1,begin=400,end=700,ColorSpace=sRGB](-7.5,-1)(7.5,1)
```



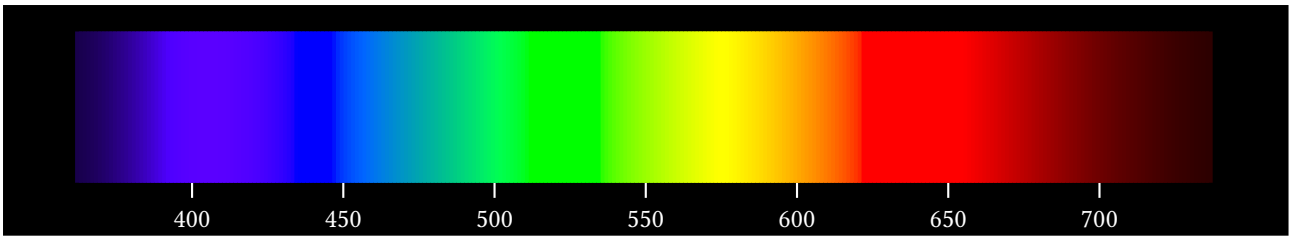
gamma=0.8

```
\psCIEspectrum[gamma=0.8,begin=400,end=700](-7.5,-1)(7.5,1)
```



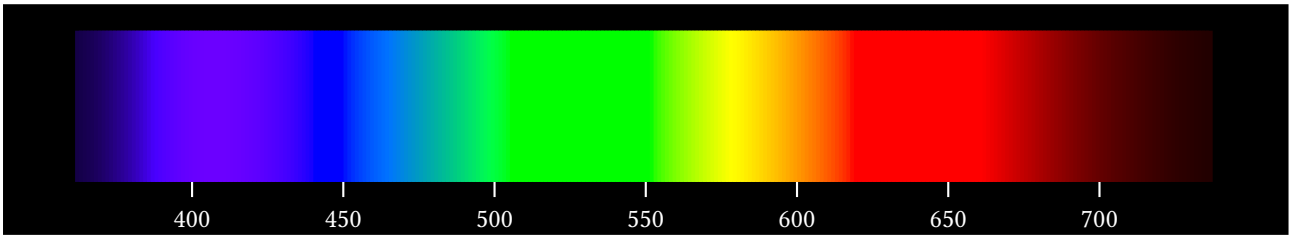
ColorSpace=Adobe

```
\psCIEspectrum[gamma=2.2,begin=400,end=700,ColorSpace=Adobe](-7.5,-1)(7.5,1)
```



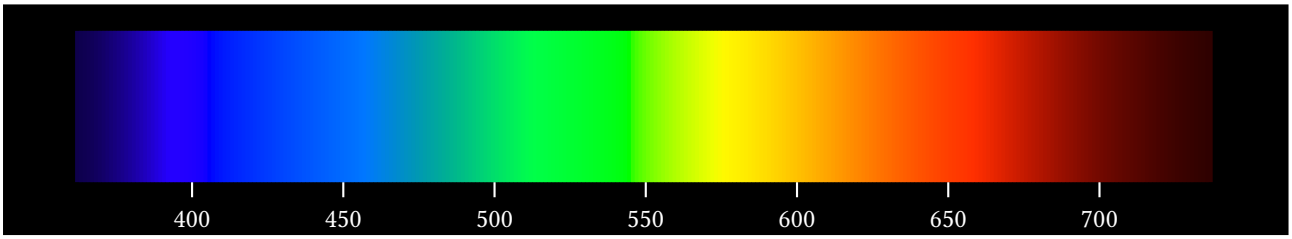
ColorSpace=ColorMatch

```
\psCIEspectrum[gamma=1.8,begin=400,end=700,ColorSpace=ColorMatch](-7.5,-1)(7.5,1)
```



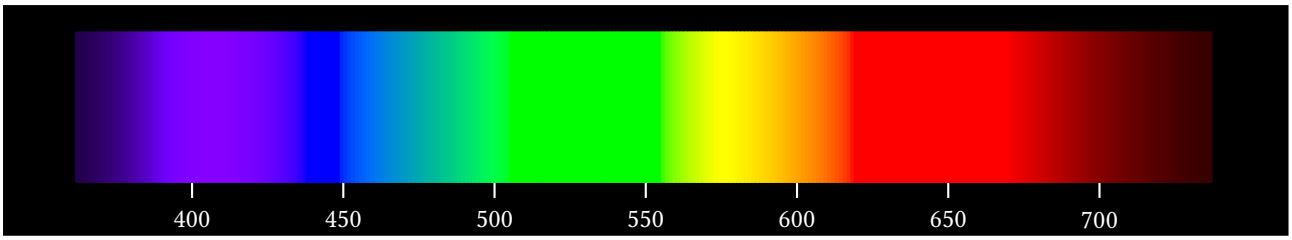
ColorSpace=CIE

```
\psCIEspectrum[begin=400,end=700,ColorSpace=CIE](-7.5,-1)(7.5,1)
```



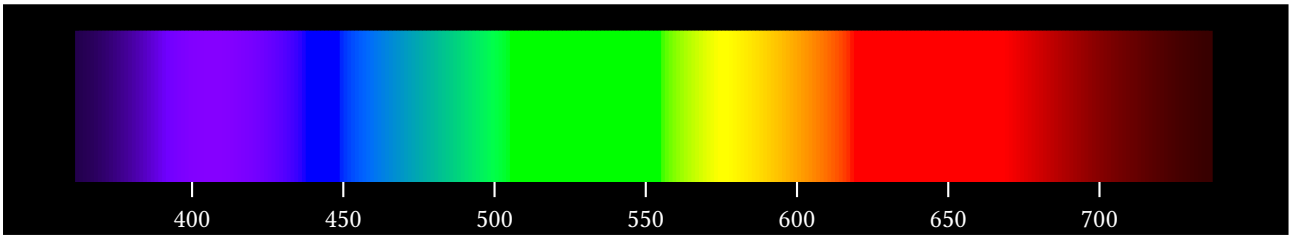
ColorSpace=SMPTE,datas=CIE1931

```
\psCIEspectrum[begin=400,end=700,ColorSpace=SMPTE,datas=CIE1931](-7.5,-1)(7.5,1)
```



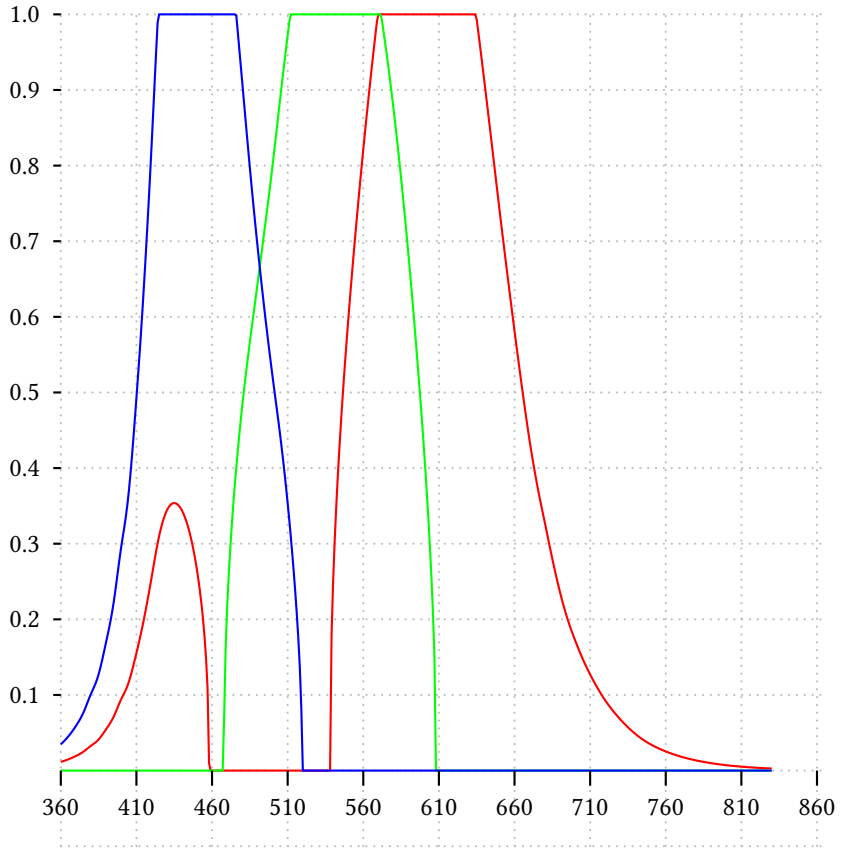
ColorSpace=SMPTE,datas=CIE1964

```
\psCIEspectrum[begin=400,end=700,ColorSpace=SMPTE,datas=CIE1964](-7.5,-1)(7.5,1)
```

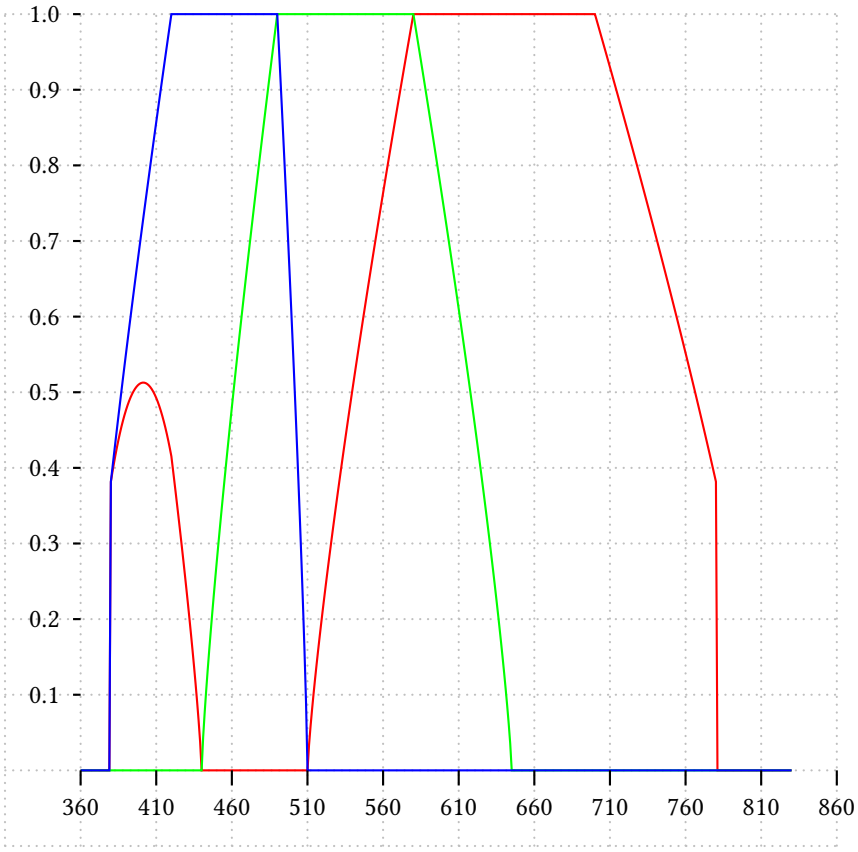


3 Comparison of the proportions of R, G, and B

This is done according to Dan Bruton's models and obtained directly from CIE data. [1]



Model CIE1931 by Adobe.



Model by Dan Bruton

References

[1] Dan Bruton. *Color Science*. URL: http://www.midnightkite.com/color.html (visited on 04/13/2026).

[2] Uwe Kern and LaTeX Project. *The xcolor package. Driver-independent color extensions for LaTeX and pdfLaTeX*. Version 3.02. Mar. 18, 2026. URL: https://ctan.org/pkg/xcolor.

[3] Arnaud Schmittbuhl. *The pst-spectra package. Draw continuum, emission and absorption spectra with PSTricks*. Version 0.91. Mar. 18, 2026. URL: https://ctan.org/pkg/pst-spectra.

[4] Herbert Voß and Dominique Rodriguez. *The pstricks-add package. A collection of add-ons and bugfixes for PSTricks*. Version 3.94. Mar. 18, 2026. URL: https://ctan.org/pkg/pstricks-add.

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