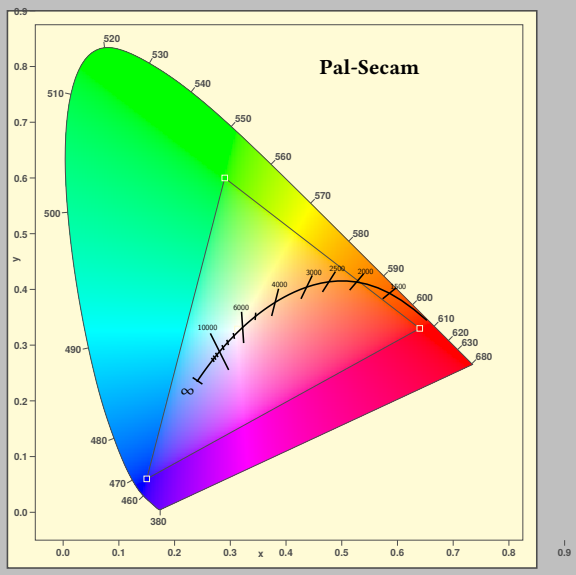
PSTricks

pst-cie: CIE xy chromaticity space

v.1.06b

April 13, 2023



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Herbert Voß

1 Introduction

Using data (CIE XYZ CIE XYZ 1931 and 1964) from the International Commission on Illumination (Commission internationale de l'éclairage) the package `pst-cie` proposes to represent the color table and / or the chromaticity diagram for different color spaces. Web page devoted to studies and performances diagrams and chromaticity tables are numerous and it is difficult to distinguish one over another, however here are some important informations: Frédéric Legrand devoted to colorimetry, and those of Daniel Metz. Yu-Chang Sung realized with the software Mathematica an interactive version of beauty: CIEChromaticityDiagram as I do not own this software I tried to do pretty much the same with PSTricks, or at least having almost the same functionality.

The macro `\psChromaticityDiagram [Options]` supports the following optional arguments:

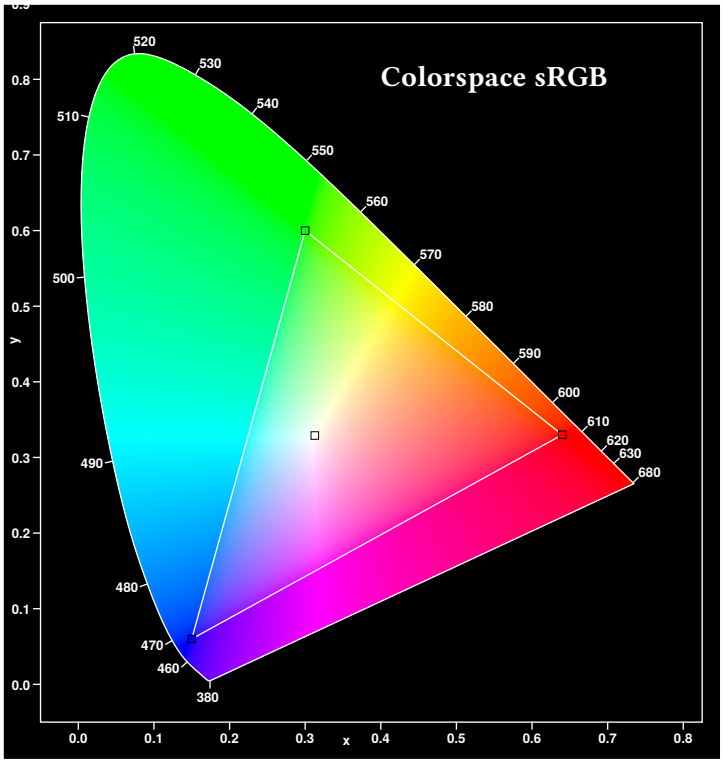
Option	*Type*	*Default*	*Description*
`gamma`	`number`	2.2	color correction
`contrast`	`number`	1	0<contrast<=1
`ColorSpace`	`name`	sRGB	colorspace
`datas`	`name`	CIE1931	CIE
`primaries`	`boolean`	true	show primary points
`trianglecolor`	`color`	black	color of the triangle
`bgcolor`	`color`	black	background color
`textcolor`	`color`	white	textcolor
`Planck`	`boolean`	false	draw the Planck' locus
`showcontour`	`boolean`	false	show the contour of the color space, only useful for using `\pstPlanck`.
`Tfontsize`	`length`	4pt	fontsize for the temperature of the Planck curve
`unit`	`number`	1	unit depending to the default size of 10cm×10cm
`PSfont`	`PS font`	Helvetica-Bold	
`fontscale`	`5`	PS font scale in pt	

The color spaces which are available are: `Adobe`, `CIE`, `ColorMatch`, `NTSC`, `Pal-Secam`, `ProPhoto`, `SMPTE`, and `sRGB`.

Tabulated values available are those of the CIE XYZ 1931 and the CIE XYZ 1964. A low value of the contrast will highlight the work area of the system displayed the colors it can represent, it is the triangle with vertices the points of primary colors included in the *Iron horse* which represents all the colors visible to the human eye.

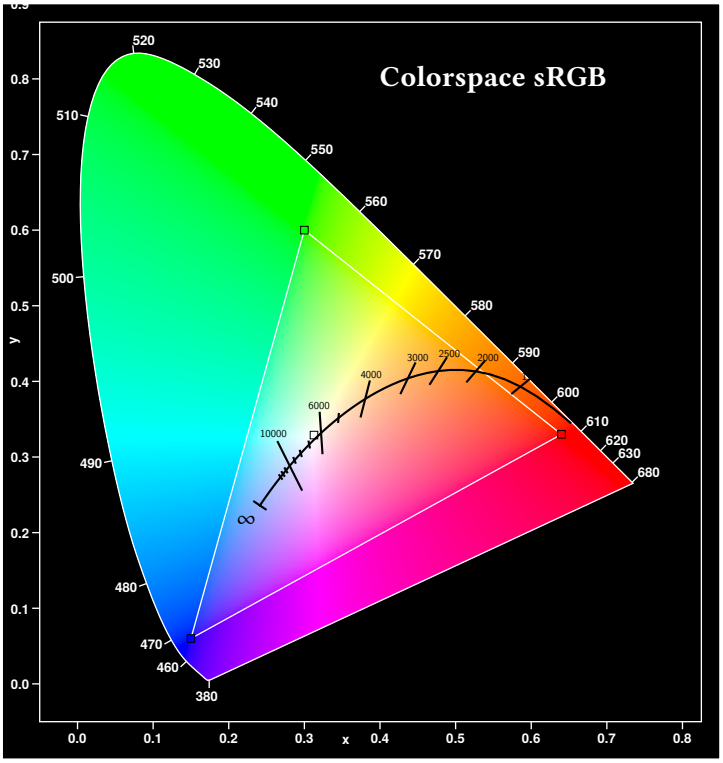
2 Examples

	Red	Green	Blue	White
x	0.6400	0.3000	0.1500	0.3127
y	0.3300	0.6000	0.0600	0.3290



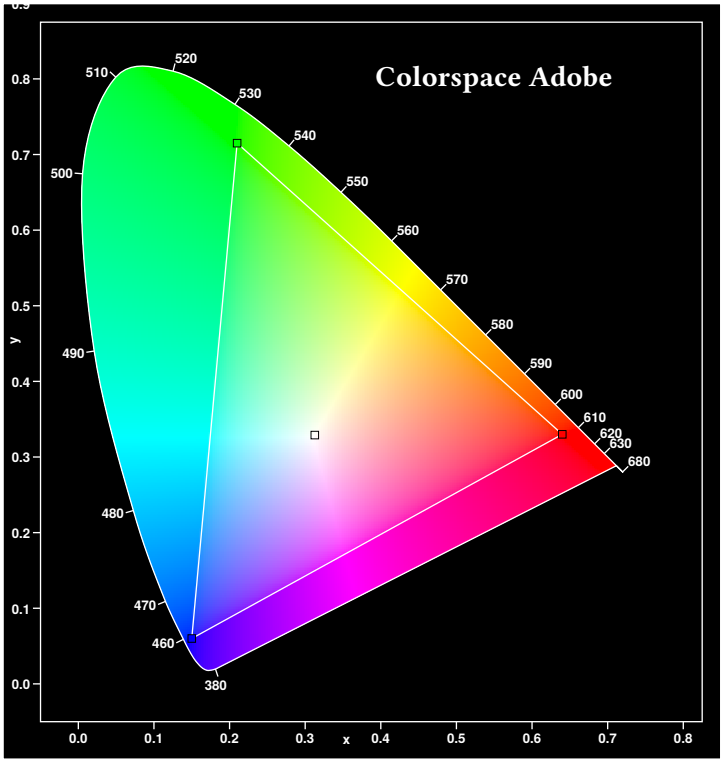

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram
\rput(5.5,8){\white \textbf{Colorspace sRGB}}
\rput(4,10){\tabsRGB}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.6400	0.3000	0.1500	0.3127
y	0.3300	0.6000	0.0600	0.3290



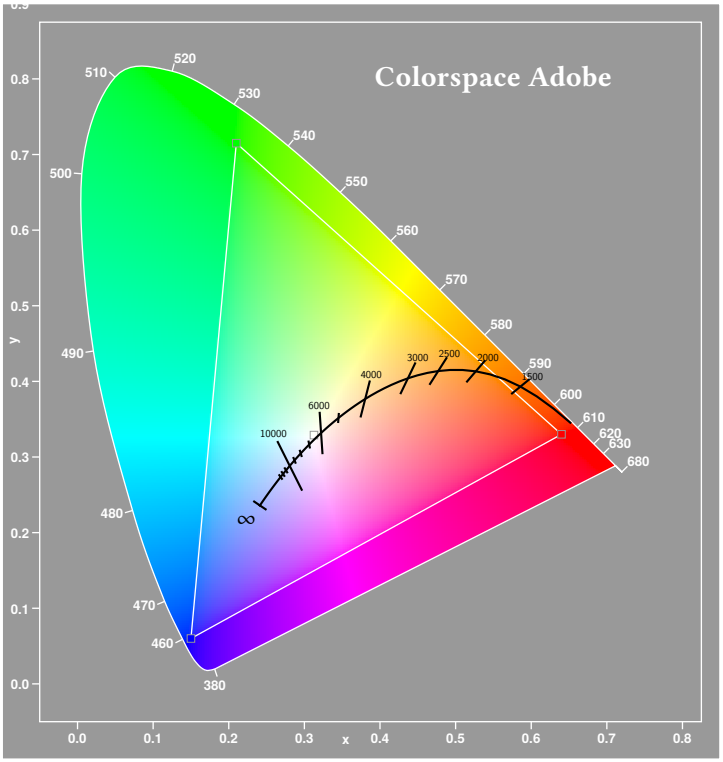

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[Planck,trianglecolor=black]
\rput(5.5,8){\white \textbf{Colorspace sRGB}}
\rput(4,10){\tabsRGB}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.6400	0.2100	0.1500	0.3127
y	0.3300	0.7150	0.0600	0.3290



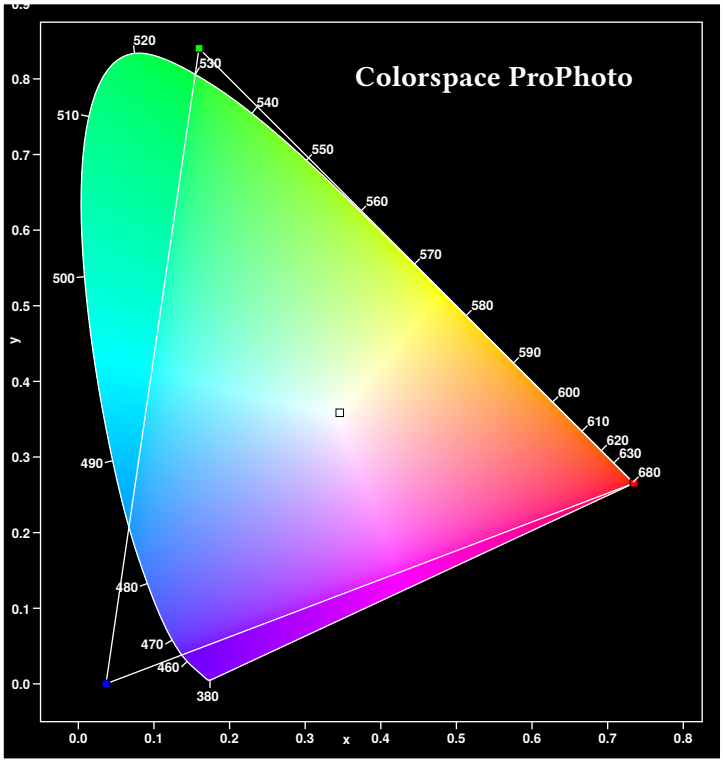

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[datas=CIE1964,ColorSpace=Adobe,contrast=0.1]
\rput(5.5,8){\white \textbf{Colorspace Adobe}}
\rput(4,10){\tabAdobe}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.6400	0.2100	0.1500	0.3127
y	0.3300	0.7150	0.0600	0.3290



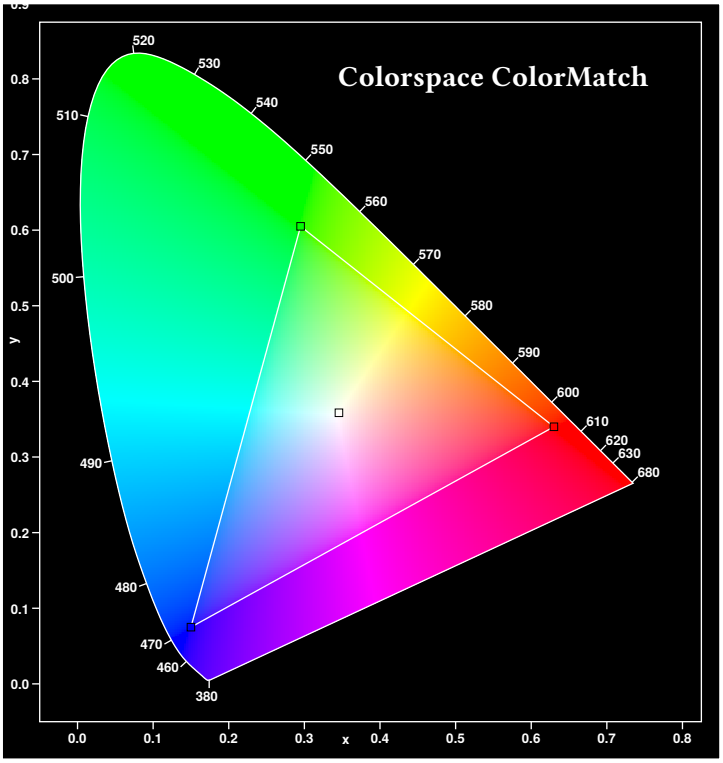

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[Planck,bgcolor=black!40,datas=CIE1964,
                       ColorSpace=Adobe,contrast=0.1]
\rput(5.5,8){\white \textbf{Colorspace Adobe}}
\rput(4,10){\tabAdobe}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.7347	0.1596	0.0366	0.3457
y	0.2653	0.8404	0.0001	0.3585



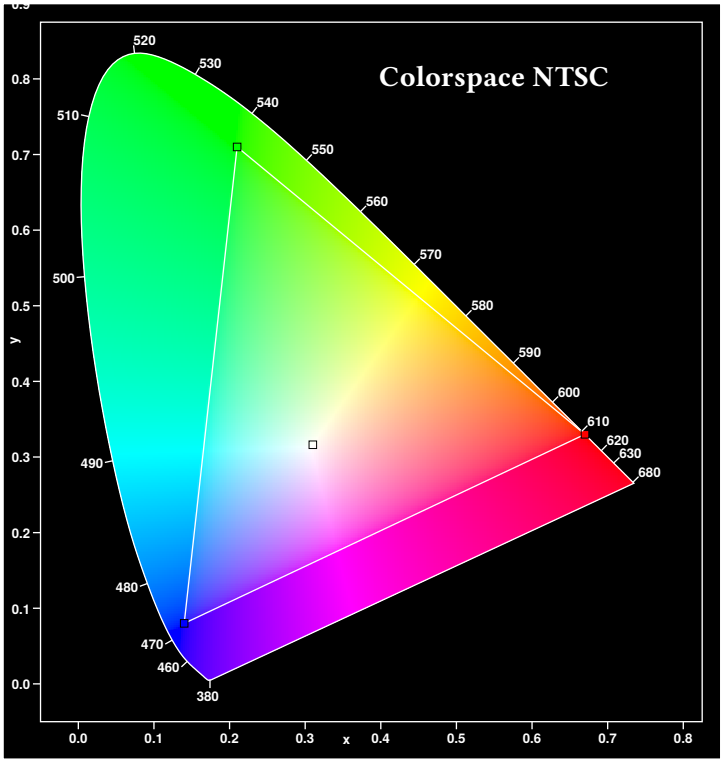

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[ColorSpace=ProPhoto,contrast=0.1]
\rput(5.5,8){\white \textbf{Colorspace ProPhoto}}
\rput(4,10){\tabProPhoto}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.6300	0.2950	0.1500	0.3457
y	0.3400	0.6050	0.0750	0.3585



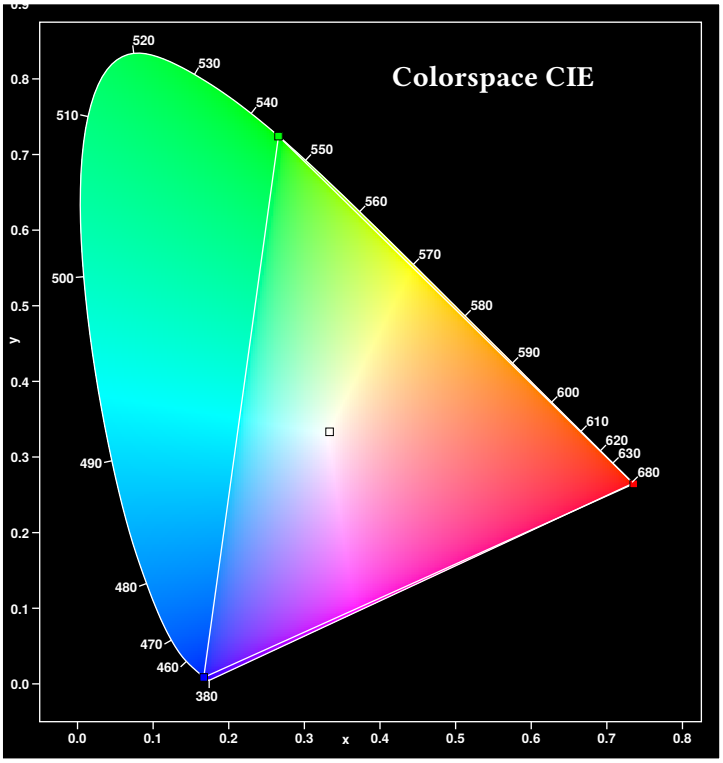

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[ColorSpace=ColorMatch,contrast=0.1]
\rput(5.5,8){\white \textbf{Colorspace ColorMatch}}
\rput(4,10){\tabColorMatch}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.6700	0.2100	0.1400	0.3101
y	0.3300	0.7100	0.0800	0.3162



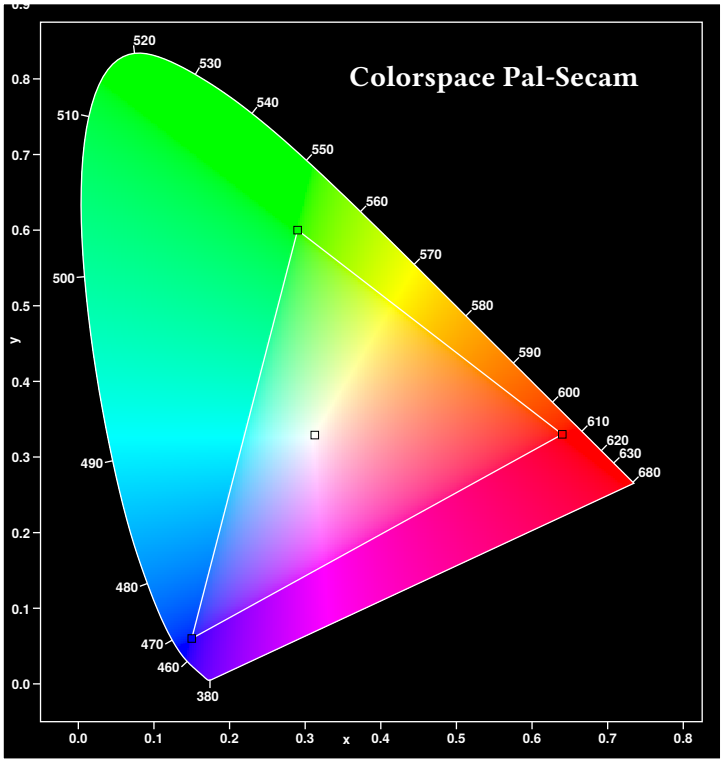

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[ColorSpace=NTSC,contrast=0.1]
\rput(5.5,8){\white \textbf{Colorspace NTSC}}
\rput(4,10){\tabNTSC}
\end{pspicture}
```

	Red	Green	Blue	White
x	0.7355	0.2658	0.1669	0.3333
y	0.2645	0.7243	0.0085	0.3333

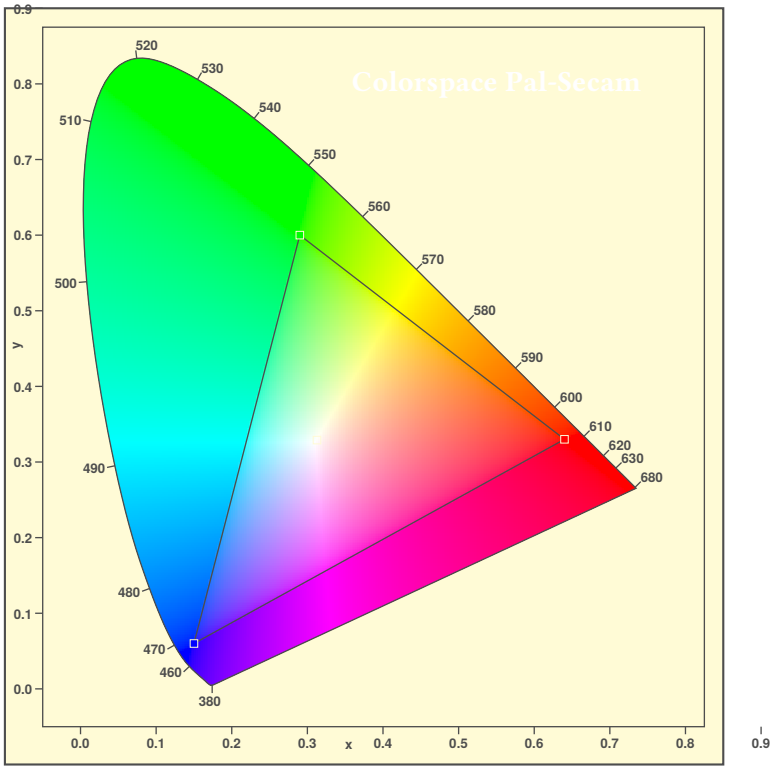



```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[ColorSpace=CIE]
\rput(5.5,8){\white \textbf{Colorspace CIE}}
\rput(4,10){\tabCIE}
\end{pspicture}
```

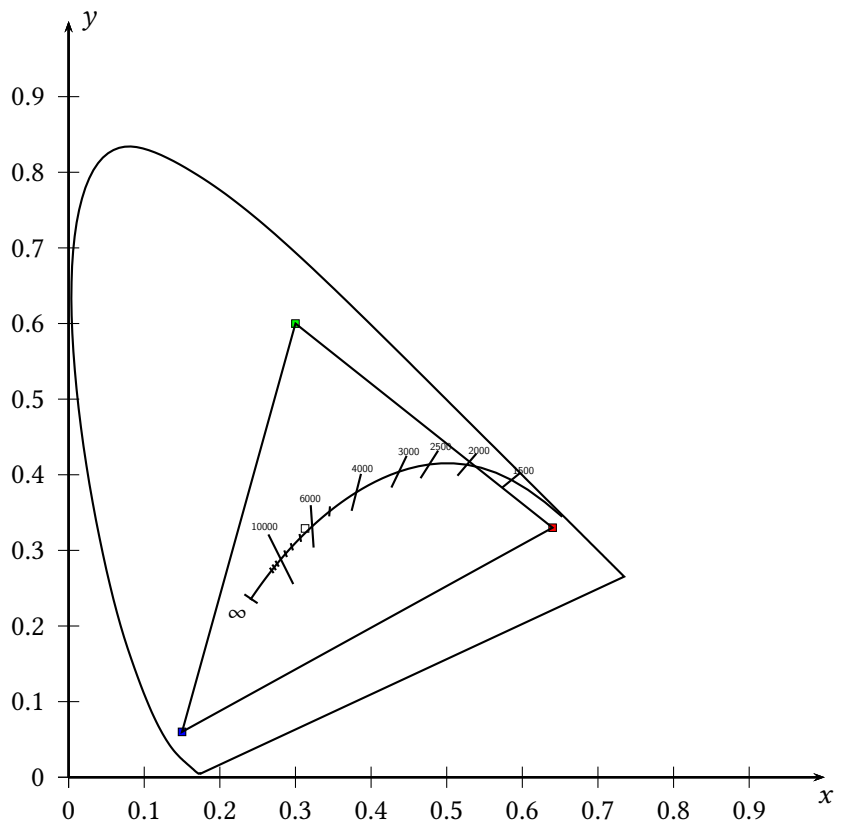
	Red	Green	Blue	White
x	0.6400	0.2900	0.1500	0.3127
y	0.3300	0.6000	0.0600	0.3290



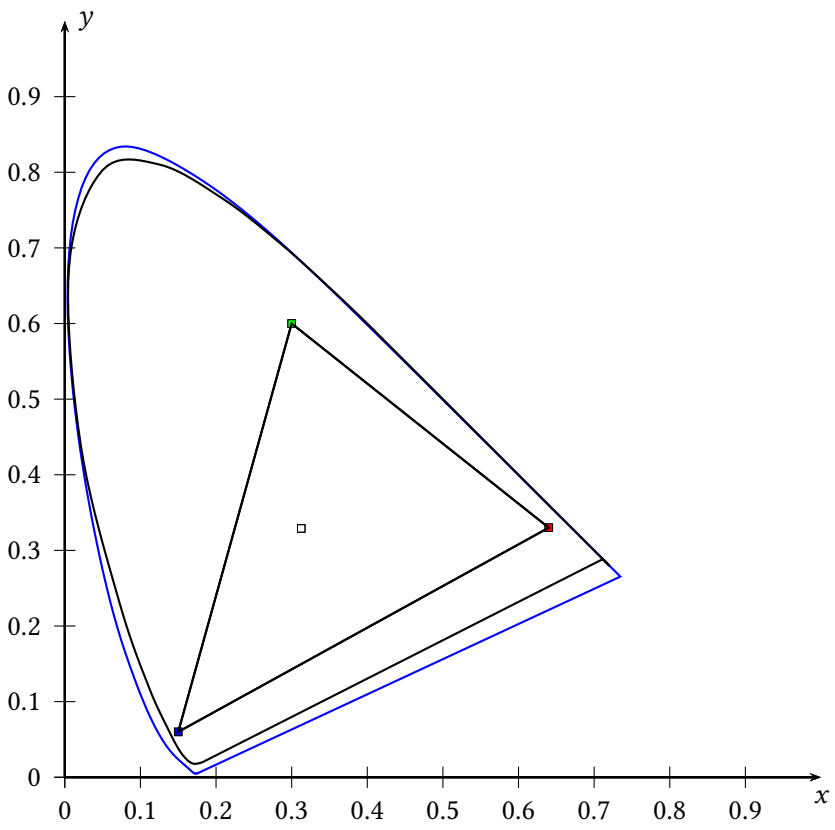

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[ColorSpace=Pal-Secam]
\rput(5.5,8){\white \textbf{Colorspace Pal-Secam}}
\rput(4,10){\tabPal-Secam}
\end{pspicture
```



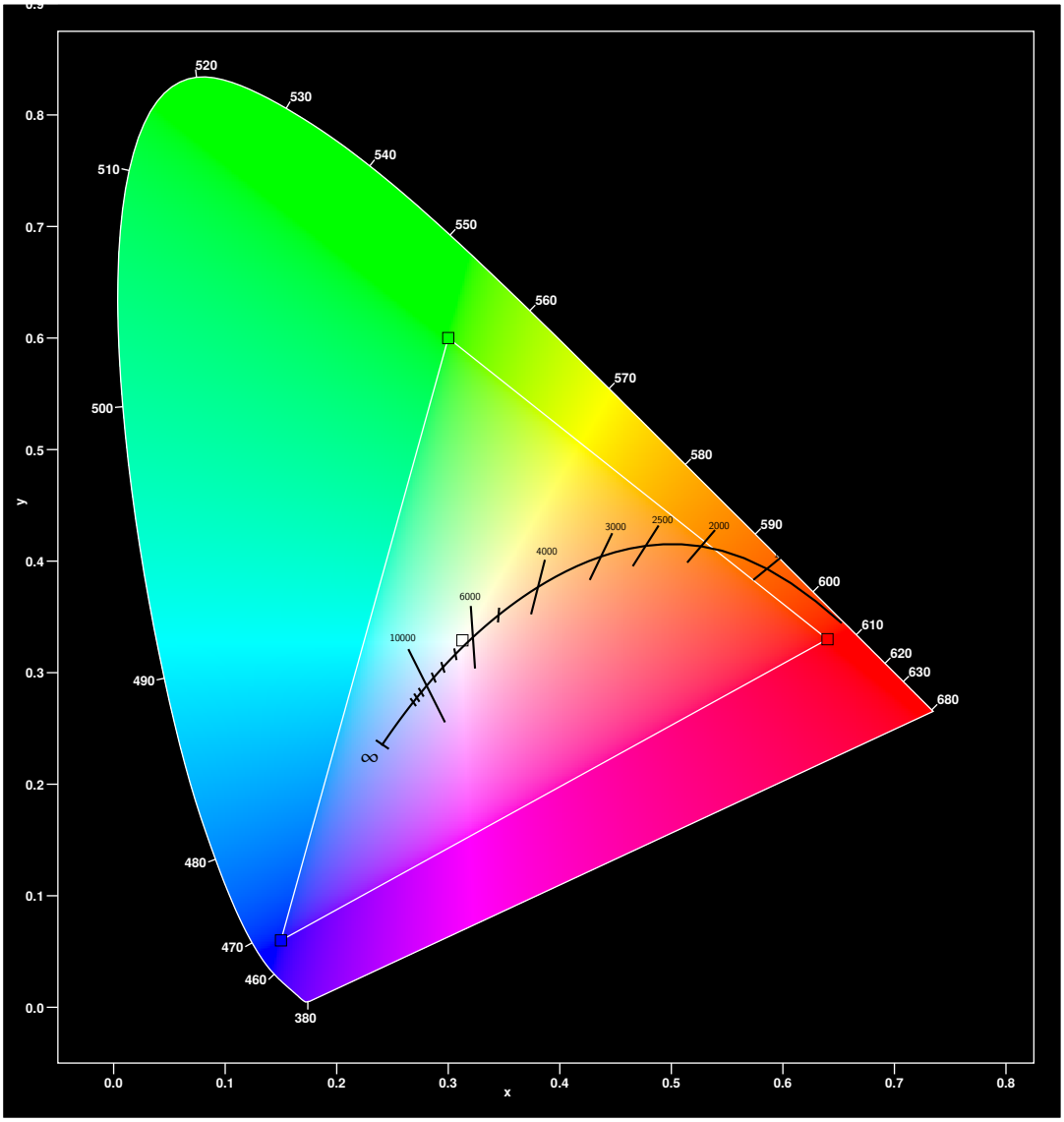

```
\begin{pspicture}(-1,-1)(8.5,11)
\psChromaticityDiagram[bgcolor=yellow!100!black!20,
               textcolor=black!70,ColorSpace=Pal-Secam]
\rput(5.5,8){\white\textbf{Colorspace Pal-Secam}}
\end{pspicture}
```



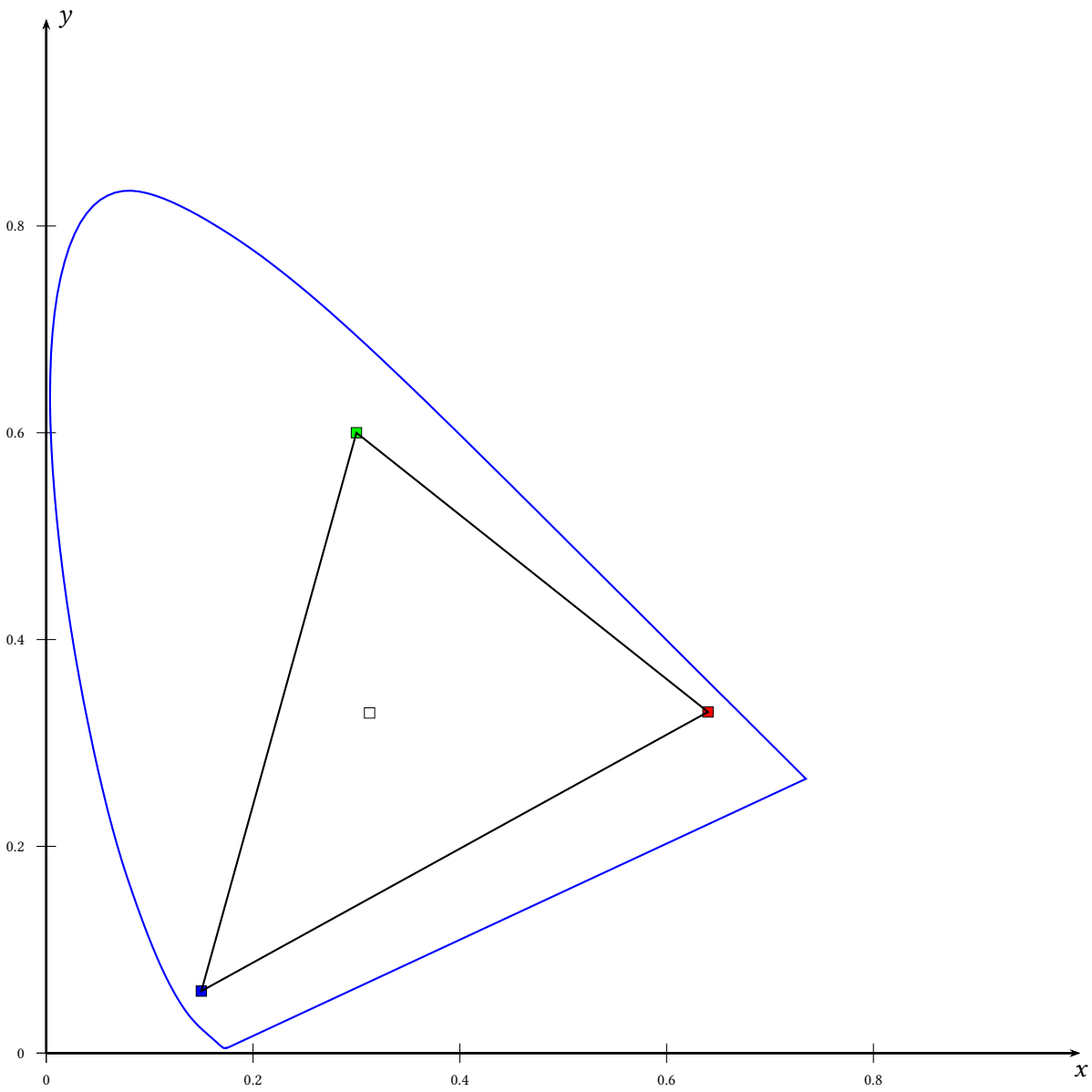

```
\begin{pspicture}(-1,-1)(10,10)
\psaxes[Dx=0.1,dx=1,Dy=0.1,dy=1]{->}(0,0)(10,10)[$x$,-90][$y$,0]
\pstPlanck[showcontour]
\end{pspicture}
```




```
\makeatletter
\begin{pspicture}(-1,-1)(10,10)
\psaxes[Dx=0.1,dx=1,Dy=0.1,dy=1]{->}(0,0)(10,10)[$x$,-90][$y$,0]
\pstCIEcontour[linecolor=blue]%
\pstCIEcontour[datas=CIE1964,linestyle=dashed]%
\end{pspicture}
\makeatother
```




```
\begin{pspicture}(-1,-1)(15,15)
\psChromaticityDiagram[unit=1.5,contrast=0.5]%
\pstPlanck[unit=1.5]
\end{pspicture}
```




```
\begin{pspicture}(-1,-1)(15,15)
\psaxes[Dx=0.2,dx=3,Dy=0.2,dy=3,
  labelFontSize=\scriptscriptstyle]{->}(0,0)(15,15)[$x$,-90][$y$,0]
\pstCIEcontour[unit=1.5,linecolor=blue]%
\end{pspicture}
```

3 List of all optional arguments for pst-cie

Key	Type	Default
gamma	ordinary	2.2
contrast	ordinary	1
chromaticityCoordinates	ordinary	xy
bgcolor	ordinary	black
textcolor	ordinary	white
trianglecolor	ordinary	black
primaries	boolean	true
Tfontsize	ordinary	[none]
Planck	boolean	true
showcontour	boolean	true
ColorSpace	ordinary	[none]
datas	ordinary	[none]

References

[1] Michel Goosens **andothers**. *The LaTeX Graphics Companion*. 2 **edition**. Reading, Mass.: Addison-Wesley Publishing Company, 2007.

[2] Laura E. Jackson **and** Herbert Voß. "Die Plot-Funktionen von pst-plot". **in***Die TeXnische Komödie*: 2/02 (**june** 2002), **pages** 27–34.

[3] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. Vaterstetten: IWT, 1989.

[4] Manuel Luque. *PSTricks application*. 2016. URL: http://pstricks.blogspot.de.

[5] Robert Sève. *Physique de la couleur – De l'apparence colorée à la technique colorimétrique*. Paris: Masson, 1996.

[6] Herbert Voß. "Die mathematischen Funktionen von Postscript". **in***Die TeXnische Komödie*: 1/02 (**march** 2002), **pages** 40–47.

[7] Herbert Voß. *PSTricks – Graphics for TeX and LaTeX*. 1 **edition**. Cambridge: UIT, 2011.

[8] Herbert Voß. *LaTeX quick reference*. Cambridge: UIT, 2011.

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