











$$\text{obs}(x) = \text{twined} + x - \text{obs}$$

polbo



polished
tiles



epobes

$$\frac{v_{\text{obs}}}{c} = \frac{f_{\text{rest}} - f_{\text{obs}}}{f_{\text{rest}}} = 1 - \frac{f_{\text{obs}}}{f_{\text{rest}}},$$

0000



0000

$$\frac{f_{\text{obs}}}{f_{\text{rest}}} = 1 + a^{\text{obs}} \quad \text{with} \quad a^{\text{obs}} \equiv -\frac{v^{\text{obs}}}{c}.$$

$$f_{\text{rest}} = \frac{f_{\text{obs}}}{1 + z_{\text{obs}}}.$$

volves

$$f^{\text{rest}}(i) = f^{\text{rest}}_{\text{tuned}} + (i - i_0) \delta f^{\text{rest}} \quad \text{with} \quad \delta f^{\text{rest}} = \frac{\delta f^{\text{obs}}}{1 + d^{\text{obs}}_{\text{sys}}} \quad \text{and} \quad d^{\text{obs}}_{\text{sys}} = -\frac{v^{\text{obs}}_{\text{sys}}}{c}.$$

THE
WORLD

voobs

avv

$$\frac{f_{\text{tuned}}^{\text{obs}}}{f_{\text{tuned}}^{\text{rest}}} = 1 + d_{\text{sys}}^{\text{obs}} \quad \text{with} \quad d_{\text{sys}}^{\text{obs}} \equiv - \frac{v_{\text{sys}}^{\text{obs}}}{c}.$$

police

—

police

ovobes (v) = ovobes - ves.

$$\frac{f_{\text{obs}}(i)}{f_{\text{tuned}}^{\text{rest}}} = 1 + d^{\text{obs}}(i) \quad \text{with} \quad d^{\text{obs}}(i) \equiv -\frac{v^{\text{obs}}(i)}{c}.$$

$$\delta v^{\text{obs}}(i) = c \frac{f^{\text{obs}}_{\text{tuned}} - f^{\text{obs}}(i)}{f^{\text{rest}}_{\text{tuned}}},$$

$$v^{\text{obs}}(i) = v_{\text{sys}}^{\text{obs}} + (i - i_0) \delta v^{\text{obs}} \quad \text{with} \quad \delta v^{\text{obs}} = -c \frac{\delta f^{\text{obs}}}{f_{\text{rest}}^{\text{obs}}}.$$

forbes

100

police
RF

police

IT

$$\text{probe}(i) = \text{Signed}[\text{probe}(i) - \text{probe}(i)]$$

2021

10

10

1

9100

11

11

$$\text{obs}(\text{IF}) = \text{obs}(\text{IF} \text{ turned}) + \text{obs}(\text{IF})$$

Robo
Returned = Assigned (Robo
Returned - Robo) = Cost.

robots

if viewed

$$f_{RF}^{obs}(i) = (f_{IO}^{obs} + s_{B_{sign}} f_{IF}^{obs}) + s_{B_{sign}}(i - i_0) \delta f_{IF}^{obs}.$$

robots

RF+viewd

Robbie
Gibson

forbid
indis

$$f_{\text{sig}}^{\text{obs}}(i) = f_{\text{sig,tuned}}^{\text{obs}} + SB_{\text{sign}}(i - i_0) \quad \text{with} \quad f_{\text{sig,tuned}}^{\text{obs}} \equiv f_{\text{LO}}^{\text{obs}} + SB_{\text{sign}} f_{\text{If tuned}}^{\text{obs}}$$

$$f_{\text{ima}}^{\text{obs}}(i) = f_{\text{ima,tuned}}^{\text{obs}} - SB_{\text{sign}}(i - i_0) \quad \text{with} \quad f_{\text{ima,tuned}}^{\text{obs}} \equiv f_{\text{LO}} - SB_{\text{sign}} f_{\text{ftuned}}^{\text{obs}}$$

SEIBIGER
SPOBES

English

spobs

IF

o

jobs

IT

2

o

$$f_{\text{sig}}^{\text{obs}}(i) = f_{\text{sig,tuned}}^{\text{obs}} + (i - i_0) \delta f_{\text{IF}}^{\text{obs}} \text{ with } f_{\text{sig,tuned}}^{\text{obs}} = f_{\text{LO}} + SB_{\text{sig}} f_{\text{IF,tuned}}^{\text{obs}}$$

$$f_{\text{ina}}^{\text{obs}}(i) = f_{\text{ina,tuned}}^{\text{obs}}(i - i_0) \delta f_{\text{IF}}^{\text{obs}} \text{ with } f_{\text{ina,tuned}}^{\text{obs}} = f_{\text{LO}} - SB_{\text{sign}} f_{\text{IFtuned}}^{\text{obs}}$$

spobs

20.

$$\text{rest}(v) = \text{rest}(\text{turned} + v - \text{old}(\text{rest}))$$

$$\text{first}(\text{rest}(\text{ima})) = \text{first}(\text{ima}, \text{turned}) - \text{rest}(\text{rest}(\text{ima}))$$

$$\delta f_{\text{rest}} = \frac{\delta f_{\text{IF}}^{\text{obs}}}{1 + d_{\text{sys}}^{\text{obs}}} \quad \text{and} \quad d_{\text{sys}}^{\text{obs}} = - \frac{v_{\text{sys}}^{\text{obs}}}{c}.$$

Free,
paid, loved

first
in a, turned

$$sB_{\text{sep}}^{\text{obs}} = sB_{\text{sig}}^{\text{obs}} [sB_{\text{sig, tuned}}^{\text{obs}} - sB_{\text{ina, tuned}}^{\text{obs}}]$$

SBobs
sep

—

CSte

—

2

obs

IFtwed

$$\frac{f_{\text{sig,tuned}}^{\text{obs}}}{f_{\text{sig,tuned}}^{\text{rest}}} = 1 + a_{\text{sys}}^{\text{obs}}$$

$$\frac{f_{\text{ima,tuned}}^{\text{obs}}}{f_{\text{ima,tuned}}^{\text{rest}}} = 1 + a_{\text{sys}}^{\text{obs}}.$$

9rest
= 9Bsign
[rest
sign, turned
rest
ima, turned]

$$S_{\text{obs}}^{\text{sep}} = S_{\text{rest}}^{\text{sep}} [1 + z_{\text{obs}}],$$

$$f_{\text{ima,tuned}}^{\text{rest}} = f_{\text{sig,tuned}}^{\text{rest}} - \frac{SB_{\text{sep}}^{\text{obs}}}{SB_{\text{sign}} [1 + d_{\text{sys}}^{\text{obs}}]}.$$

$$f_{\text{lsr}} = f_{\text{obs}} + f_{\text{rest}} \frac{v_{\text{obs}} - v_{\text{lsr}}}{c},$$

$$f^{\mathrm{obs}} = f^{\mathrm{rest}} \left(1 - \frac{v_{\mathrm{sys}}^{\mathrm{obs}}}{c} \right) \quad \text{and} \quad f^{\mathrm{lsr}} = f^{\mathrm{rest}} \left(1 - \frac{v_{\mathrm{sys}}^{\mathrm{lsr}}}{c} \right).$$

[Signed first observations]

$$f_{\text{sig,tuned}}^{\text{lsr}} = f_{\text{sig,tuned}}^{\text{obs}} + f_{\text{sig,tuned}}^{\text{rest}} \frac{v_{\text{sys}}^{\text{obs}} - v_{\text{sys}}^{\text{lsr}}}{c}.$$

$$f^{\mathrm{l sr}}(i) = f^{\mathrm{o bs}}(i) + f^{\mathrm{rest}}_{\mathrm{sig,tuned}} \frac{v^{\mathrm{o bs}}_{\mathrm{sys}} - v^{\mathrm{l sr}}_{\mathrm{sys}}}{c} \, ,$$

$$f^{\mathrm{lsr}}(z) = f^{\mathrm{obs}}(z) + f^{\mathrm{rest}}(z) \frac{v^{\mathrm{obs}}_{\mathrm{sys}} - v^{\mathrm{lsr}}_{\mathrm{sys}}}{c}.$$

$$\Delta f^{\mathrm{lsr}}(i) = (i - i_0) \delta f^{\mathrm{rest}} \frac{v_{\mathrm{sys}}^{\mathrm{obs}} - v_{\mathrm{sys}}^{\mathrm{lsr}}}{c}.$$



rest
tired, big

rest
titled, in

A pixelated, grayscale image of the text "01000000" in a monospace font. The characters are rendered with a dithered effect, using various shades of gray to create a textured appearance. The background is white.



evangelical

www.pearsoned.com

QWERTY

$$\text{rest}(v) = \text{rest}(\text{turned} + v - \text{old}(\text{rest}))$$

$$\text{first}(\text{ima}) = \text{first}(\text{ima}, \text{turned}) - \text{zero}(\text{rest})$$

$$\delta f_{\text{rest}} = \frac{\delta f_{\text{IF}}^{\text{meas}}}{1 + d_{\text{sys}}^{\text{meas}}} \quad \text{and} \quad d_{\text{sys}}^{\text{meas}} = - \frac{v_{\text{sys}}^{\text{meas}}}{c},$$



www.pearsoned.com

$$v^{\text{meas}}(i) = v_{\text{sys}}^{\text{meas}} + (i - i_0) \delta v^{\text{meas}} \quad \text{with} \quad \delta v^{\text{meas}} = -c \frac{\delta f^{\text{meas}}}{f_{\text{rest}}^{\text{tuned}}}.$$

$$v^{\mathrm{lsr}}(i) = v_{\mathrm{sys}}^{\mathrm{lsr}} + (i - i_0) \delta v^{\mathrm{lsr}} \quad \text{with} \quad \delta v^{\mathrm{lsr}} = -c \frac{\delta f^{\mathrm{lsr}}}{f_{\mathrm{tuned}}^{\mathrm{rest}}}.$$

$$v^{\mathrm{lsr}}(i) = v_{\mathrm{sys}}^{\mathrm{lsr}} + (i - i_0) \delta v^{\mathrm{obs}} \quad \text{with} \quad \delta v^{\mathrm{obs}} = -c \frac{\delta f^{\mathrm{obs}}}{f_{\mathrm{rest}}^{\mathrm{obs}}}.$$

$$\frac{\delta v^{\text{obs}} - \delta v^{\text{l sr}}}{\delta v^{\text{l sr}}} = \frac{\delta f^{\text{obs}}}{\delta f^{\text{l sr}}} - 1 = \frac{1 + d_{\text{sys}}^{\text{l sr}}}{1 + d_{\text{sys}}^{\text{obs}}} - 1.$$



$$\frac{\delta v^{\text{obs}} - \delta v^{\text{l sr}}}{\delta v^{\text{l sr}}} = \frac{v_{\text{sys}}^{\text{obs}} - v_{\text{sys}}^{\text{l sr}}}{c} \sim 10^{-4}.$$

W

20

100

1





$$\delta f^{\text{l sr}} = \delta f^{\text{obs}} \frac{1 + d_{\text{sys}}^{\text{obs}}}{1 + d_{\text{sys}}^{\text{l sr}}}, \quad \delta v^{\text{l sr}} = -c \frac{\delta f^{\text{l sr}}}{f_{\text{tuned}}^{\text{rest}}}, \quad \text{and} \quad d^{\text{l sr}} = 1 - \frac{v^{\text{l sr}}}{c}.$$

Free to
give



Forest, old + 2 - 20, old forest,

first new + 20 new of first

$$\delta f_{\text{rest}} = \frac{\delta f_{\text{IF}}^{\text{meas}}}{1 + d_{\text{sys}}^{\text{meas}}}.$$

$$i_{0,\text{new}} = i_{0,\text{old}} + \frac{f_{\text{sig,new}}^{\text{rest}} - f_{\text{sig,old}}^{\text{rest}}}{\delta f_{\text{IF}}^{\text{meas}}} (1 + d_{\text{sys}}^{\text{meas}})$$

1992

1992

rest, old, old, old, rest,

rest
ima,new) 20,new) 6 rest ;

first
aid, dew

$\text{forest_sig_old} + (\text{old_new} - \text{old_old}) \times \text{forest_}$

Free
idea, over

rest
ima,old
- 20,new
- 20,old
rest

$$\text{frest_ima_new} + \text{frest_sig_new} = \text{frest_ima_old} + \text{frest_sig_old}$$

$$\delta v_{\text{new}}^{\text{meas}} = -c \frac{\delta f^{\text{meas}}}{f^{\text{rest}}_{\text{sig,new}}}.$$

$$\text{mean}(\text{rest} \sim (1 + \text{old})) = \text{mean}(\text{rest} \sim (1 + \text{new}))$$

$$d_{\text{old}}^{\text{meas}} = - \frac{v_{\text{sys,old}}^{\text{meas}}}{c} \quad \text{and} \quad d_{\text{new}}^{\text{meas}} = - \frac{v_{\text{sys,new}}^{\text{meas}}}{c} .$$

$$f_{\text{rest new}} = f_{\text{rest old}} \frac{1 + d_{\text{meas old}}}{1 + d_{\text{meas new}}}.$$

First (2)

rest
size, turned
+ 2
- 20, new
of rest
new

$$[f_{\text{sig,tuned}}^{\text{rest}} + (i - i_{0,\text{old}}) \delta f_{\text{old}}^{\text{rest}}] \frac{1 + d_{\text{old}}^{\text{meas}}}{1 + d_{\text{new}}^{\text{meas}}}.$$

$$i0_{,new} = i0_{,old} + \frac{f_{sig,tuned}^{rest}}{\delta f_{old}^{meas}} [d_{new}^{meas} - d_{old}^{meas}] ,$$

$$\delta f_{\text{new}}^{\text{rest}} = \delta f_{\text{old}}^{\text{rest}} \frac{1 + d_{\text{old}}^{\text{meas}}}{1 + d_{\text{new}}^{\text{meas}}}, \quad \text{i.e.,} \quad \delta f_{\text{new}}^{\text{meas}} = \delta f_{\text{old}}^{\text{meas}}.$$

first
in a new way

```

forest
ima,turned,new)
-i-20,new)
forest
new

```

$$\left[f_{\text{ima,tuned,old}}^{\text{rest}} - (i - i_{0,\text{old}}) \delta f_{\text{old}}^{\text{rest}} \right] \frac{1 + d_{\text{old}}^{\text{meas}}}{1 + d_{\text{new}}^{\text{meas}}}.$$

$$f_{\text{ima,new}}^{\text{rest}} = f_{\text{ima,old}}^{\text{rest}} \frac{1 + d_{\text{old}}^{\text{meas}}}{1 + d_{\text{new}}^{\text{meas}}} - f_{\text{sig,tuned}}^{\text{rest}} \frac{d_{\text{new}}^{\text{meas}} - d_{\text{old}}^{\text{meas}}}{1 + d_{\text{new}}^{\text{meas}}}.$$

$$d_{\text{old}}^{\text{meas}} = \frac{v_{\text{lsr}}^{\text{meas}} + v_{\text{sys,old}}^{\text{lsr}}}{c} \quad \text{and} \quad d_{\text{new}}^{\text{meas}} = \frac{v_{\text{lsr}}^{\text{meas}} + v_{\text{sys,new}}^{\text{lsr}}}{c}.$$

$$d_{\text{new}}^{\text{meas}} = d_{\text{old}}^{\text{meas}} + \frac{v_{\text{sys,old}}^{\text{l sr}} - v_{\text{sys,new}}^{\text{l sr}}}{c}.$$

$$f_{\text{obs}} = f_{\text{rest}} \frac{\sqrt{c^2 - v_{\text{obs}}^2}}{c + v_{\parallel \text{obs}}},$$

$$v_{obs}^2 = v_{||}^2 + v_{\perp}^2$$

robots

volobas

volves

is

volves

$$f^{\text{obs}} = f^{\text{rest}} \sqrt{\frac{c - v_{\parallel}^{\text{obs}}}{c + v_{\parallel}^{\text{obs}}}}.$$

$$f_{\text{obs}} = f_{\text{rest}} \left(1 - \frac{v_{\text{obs}}}{c} \right).$$

$$v^{\text{obs}}(i) = v_{\text{sys}}^{\text{obs}} + (i - i_0) \delta v^{\text{obs}} \quad \text{with} \quad \delta v^{\text{obs}} = -c \frac{\delta f^{\text{obs}}}{f_{\text{rest}}^{\text{obs}}}.$$

$$\lambda_{\text{obs}} = \lambda_{\text{rest}} \sqrt{\frac{c + v_{\parallel}^{\text{obs}}}{c - v_{\parallel}^{\text{obs}}}}.$$

$$\lambda_{\text{obs}} = \lambda_{\text{rest}} \left(1 + \frac{v_{\parallel}^{\text{obs}}}{c} \right).$$

$$f_{\text{obs}} = \frac{f_{\text{rest}}}{1 + \frac{v_{\text{obs}}}{c}}.$$

$$v_{\text{opt}}^{\text{obs}}(i) = v_{\text{sys,opt}}^{\text{obs}} + (i - i_0) \delta v_{\text{opt}}^{\text{obs}} \quad \text{with} \quad \delta v_{\text{opt}}^{\text{obs}} = +c \frac{\delta \lambda^{\text{obs}}}{\lambda_{\text{rest}}^{\text{tuned}}}.$$



robust
trained, conv1 = pretrained D1v1;

100

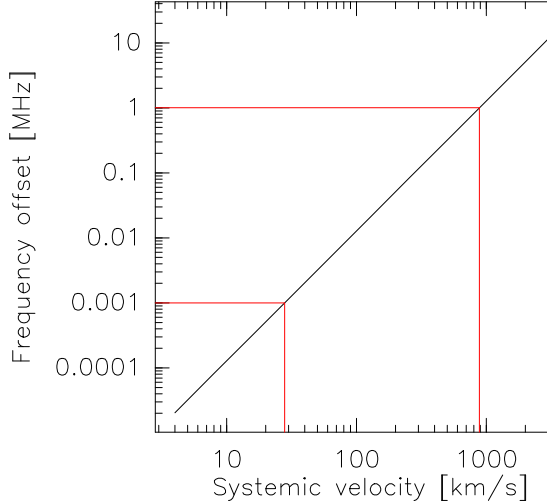
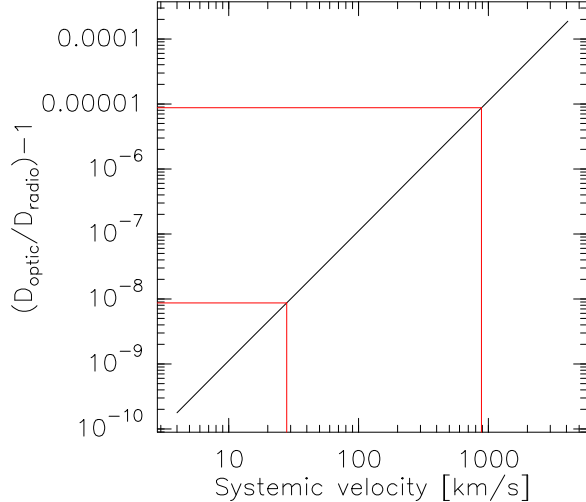
$$D_{\text{opt}}(v_{\text{opt}}) = \frac{1}{1 + \frac{v_{\text{opt}}}{c}}.$$

colours
turned, 1

120

$$\text{rest}(i) = \text{rest_apparent} + (i - i_0) \text{rest_apparent};$$

$$f_{\text{apparent}}^{\text{rest}} = f_{\text{tuned}}^{\text{rest}} \frac{D_1(v_1)}{D_2(v_1)}, \quad \text{and} \quad \delta f_{\text{apparent}}^{\text{rest}} = \delta f_{\text{tuned}}^{\text{rest}} \frac{D_1(v_1)}{D_2(v_1)}.$$





$$f_{\text{sig,new}}^{\text{rest}} = f_{\text{sig,old}}^{\text{rest}} \frac{D_{\text{optic}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{radio}}(v_{\text{sys,new}}^{\text{obs}})}, \quad f_{\text{ima,new}}^{\text{rest}} = f_{\text{ima,old}}^{\text{rest}} \frac{D_{\text{optic}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{radio}}(v_{\text{sys,new}}^{\text{obs}})},$$

$$\delta f_{\text{new}}^{\text{meas}} = \delta f_{\text{old}}^{\text{meas}} \frac{D_{\text{optic}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{radio}}(v_{\text{sys,new}}^{\text{obs}})}, \quad \text{and} \quad \delta v_{\text{new}}^{\text{meas}} = -c \frac{\delta f_{\text{new}}^{\text{meas}}}{f_{\text{sig,new}}^{\text{rest}}}.$$

First
view

Free,
instant, new

0

1

2

3

4

5

6

7

8

9

$$f_{\text{sig,new}}^{\text{rest}} = f_{\text{sig,old}}^{\text{rest}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{obs}})}, \quad f_{\text{ima,new}}^{\text{rest}} = f_{\text{ima,old}}^{\text{rest}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{obs}})},$$

$$\delta f_{\text{new}}^{\text{meas}} = \delta f_{\text{old}}^{\text{meas}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{obs}})}, \quad \text{and} \quad \delta v_{\text{new}}^{\text{meas}} = -c \frac{\delta f_{\text{new}}^{\text{meas}}}{f_{\text{sig,new}}^{\text{rest}}}.$$

$$\frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{obs}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{obs}})} = \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{lsr}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{lsr}})}.$$

$$f_{\text{sig,new}}^{\text{rest}} = f_{\text{sig,old}}^{\text{rest}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{lsr}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{lsr}})}, \quad f_{\text{ima,new}}^{\text{rest}} = f_{\text{ima,old}}^{\text{rest}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{lsr}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{lsr}})},$$

$$\delta f_{\text{new}}^{\text{meas}} = \delta f_{\text{old}}^{\text{meas}} \frac{D_{\text{relat}}(v_{\text{sys,old}}^{\text{lsr}})}{D_{\text{relat}}(v_{\text{sys,new}}^{\text{lsr}})}, \quad \text{and} \quad \delta v_{\text{new}}^{\text{meas}} = -c \frac{\delta f_{\text{new}}^{\text{meas}}}{f_{\text{sig,new}}^{\text{rest}}}.$$

1st
vol