Title: Dark Matter

Date: Aug 02, 2008 09:00 AM

URL: http://pirsa.org/08080008

Abstract:


omputer
HOW DO I
Sinusoidal Functio...
SMART Board Tools
Transfer to Dell
Special Relativity PI
wave.agg
WorldWide Telescope
cycle Bin
Documents
Autograph 3.20
Starry Night Pro Plus 6
spacetime
diff circles
Applets Physics
PI Mentor Master
be Reader 8
Dell Support Center
AP Practice Exams
MkBk2007 - Shortcut
Evolution of Galaxies T...
bh folder
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PI project
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Double Slit
MarkBook 2007
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to Dell pc
PI Mentor Master
pi stuff
DataSafe Online
Alice Law
Notebook Software
watch
Wavelengths for electrons
complex numbers
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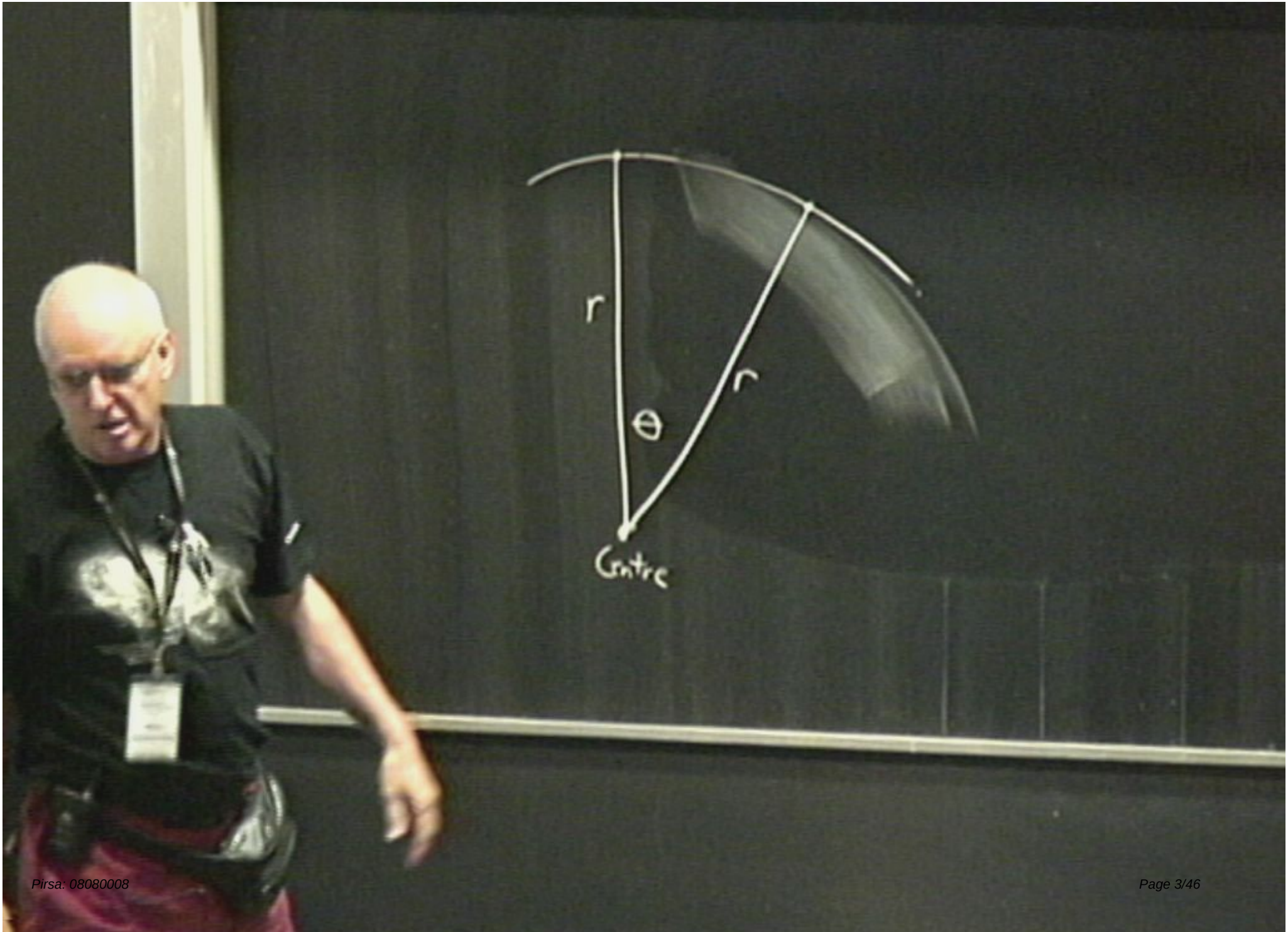
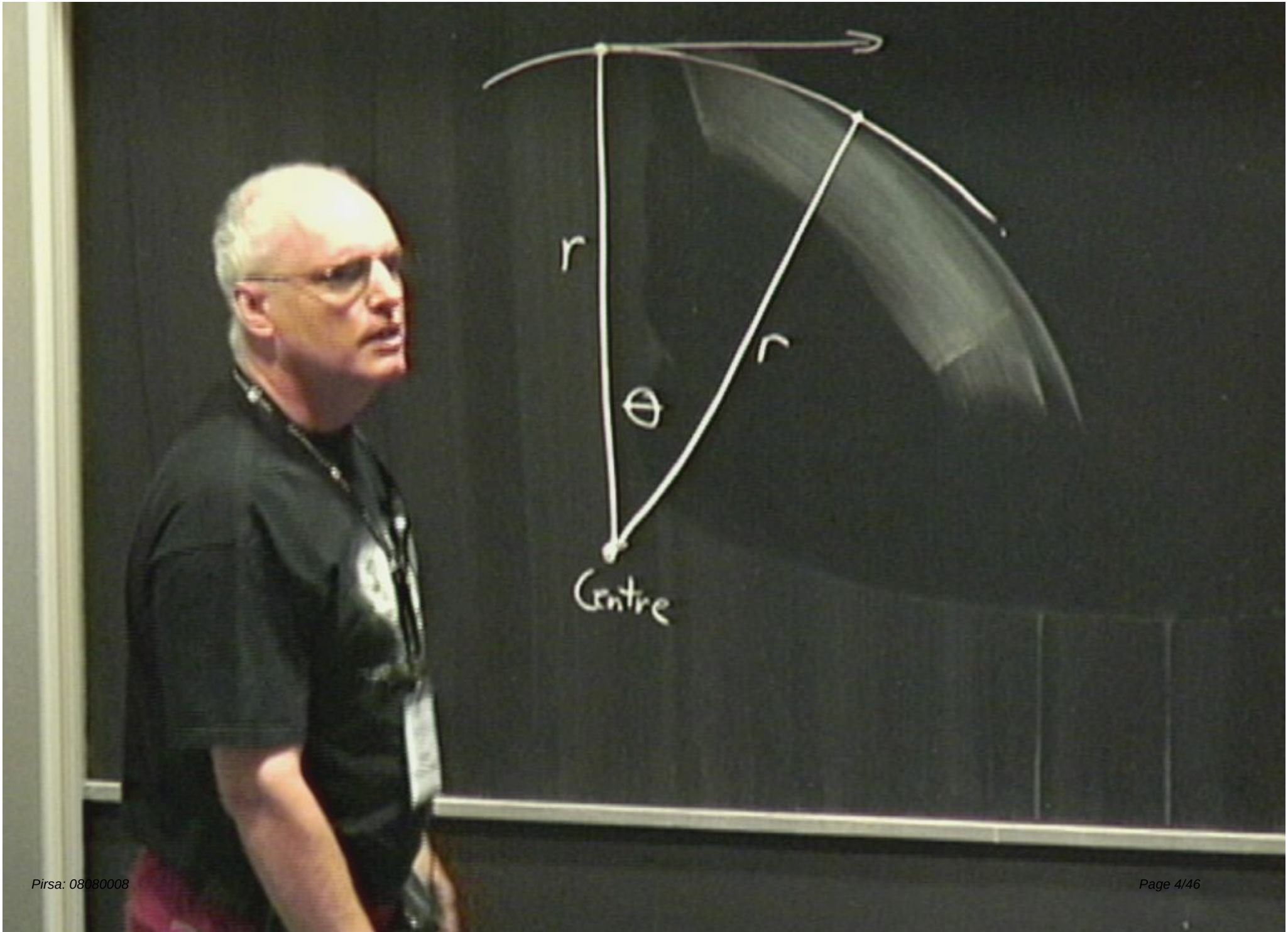
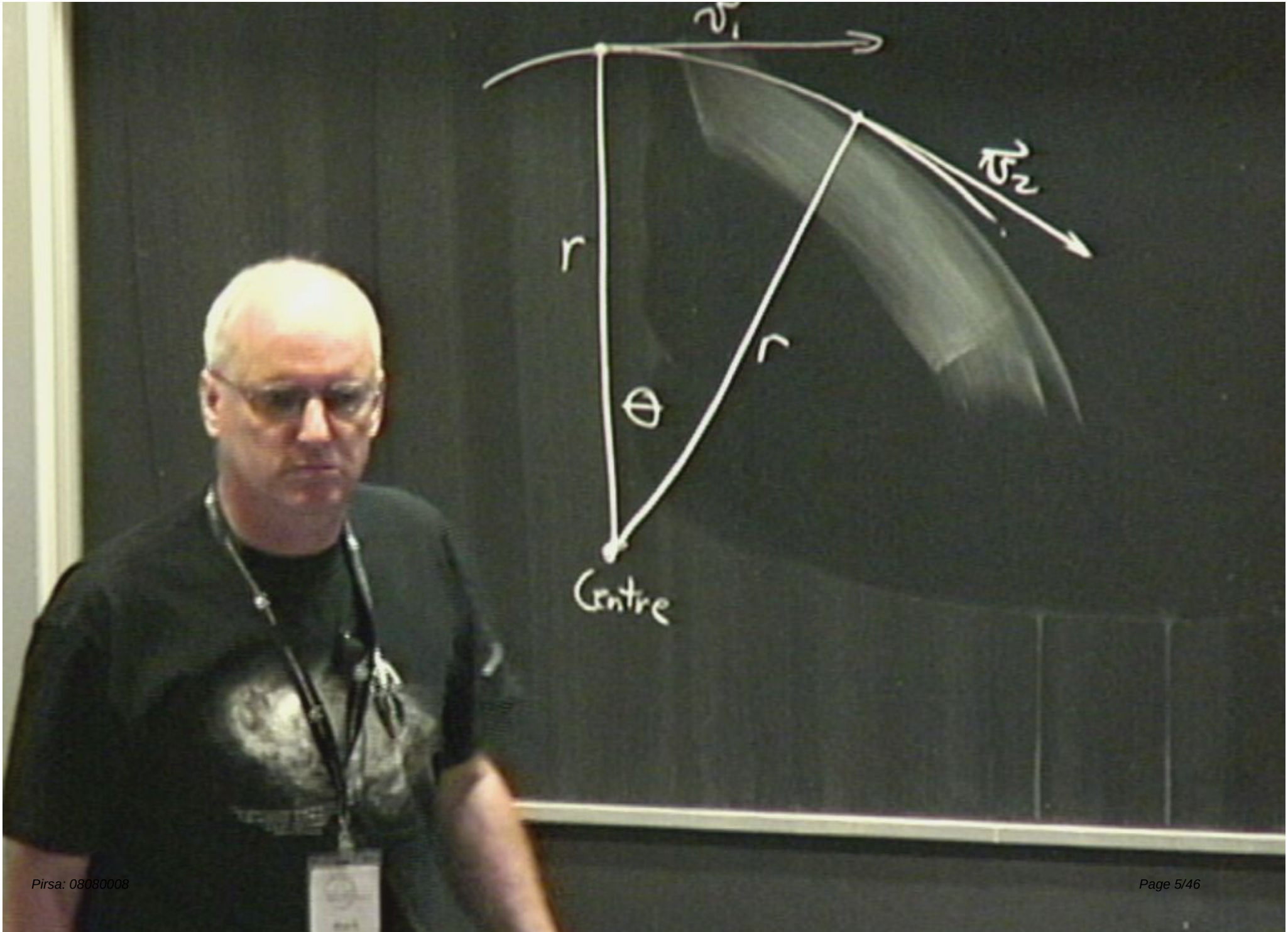
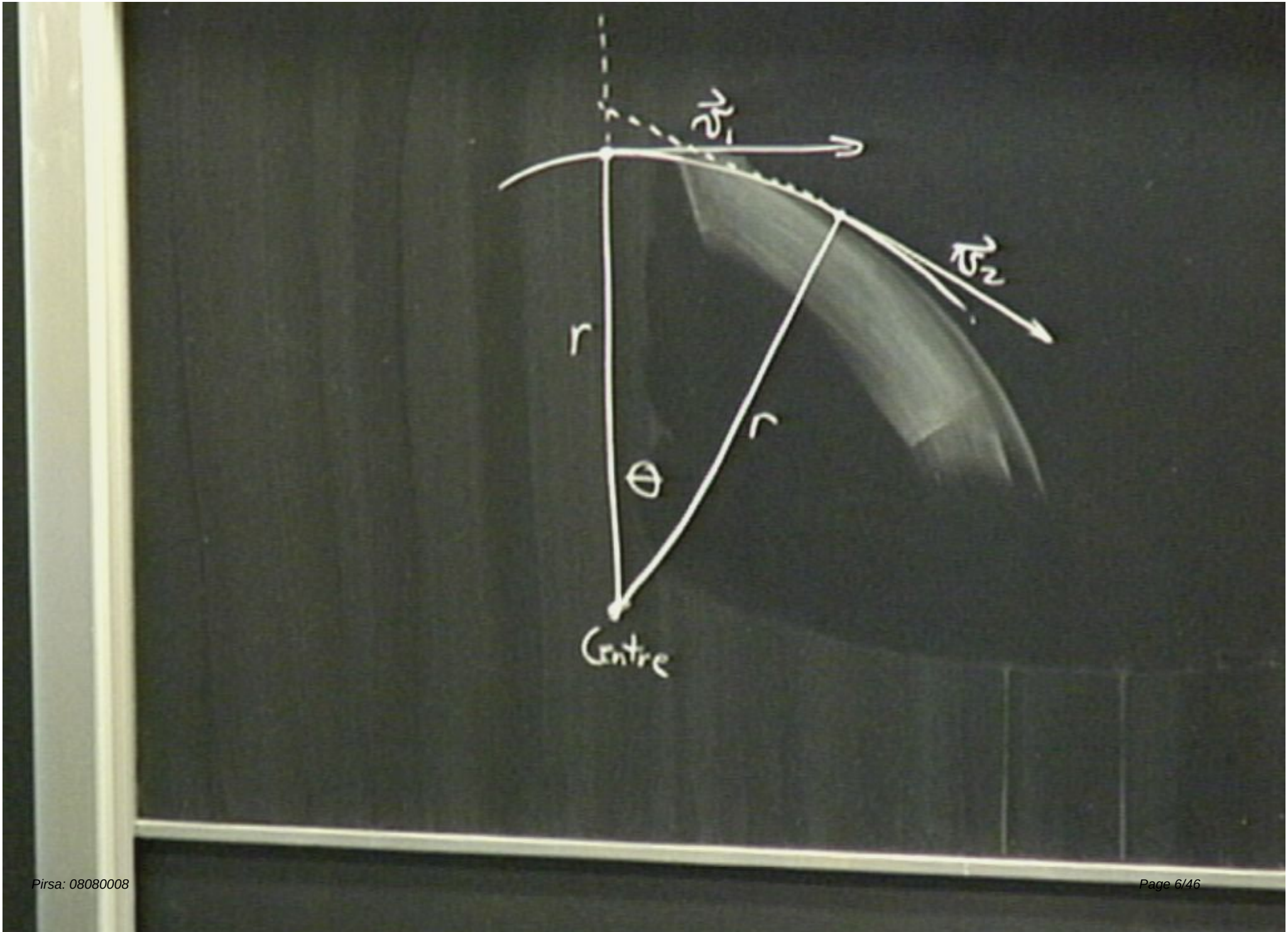
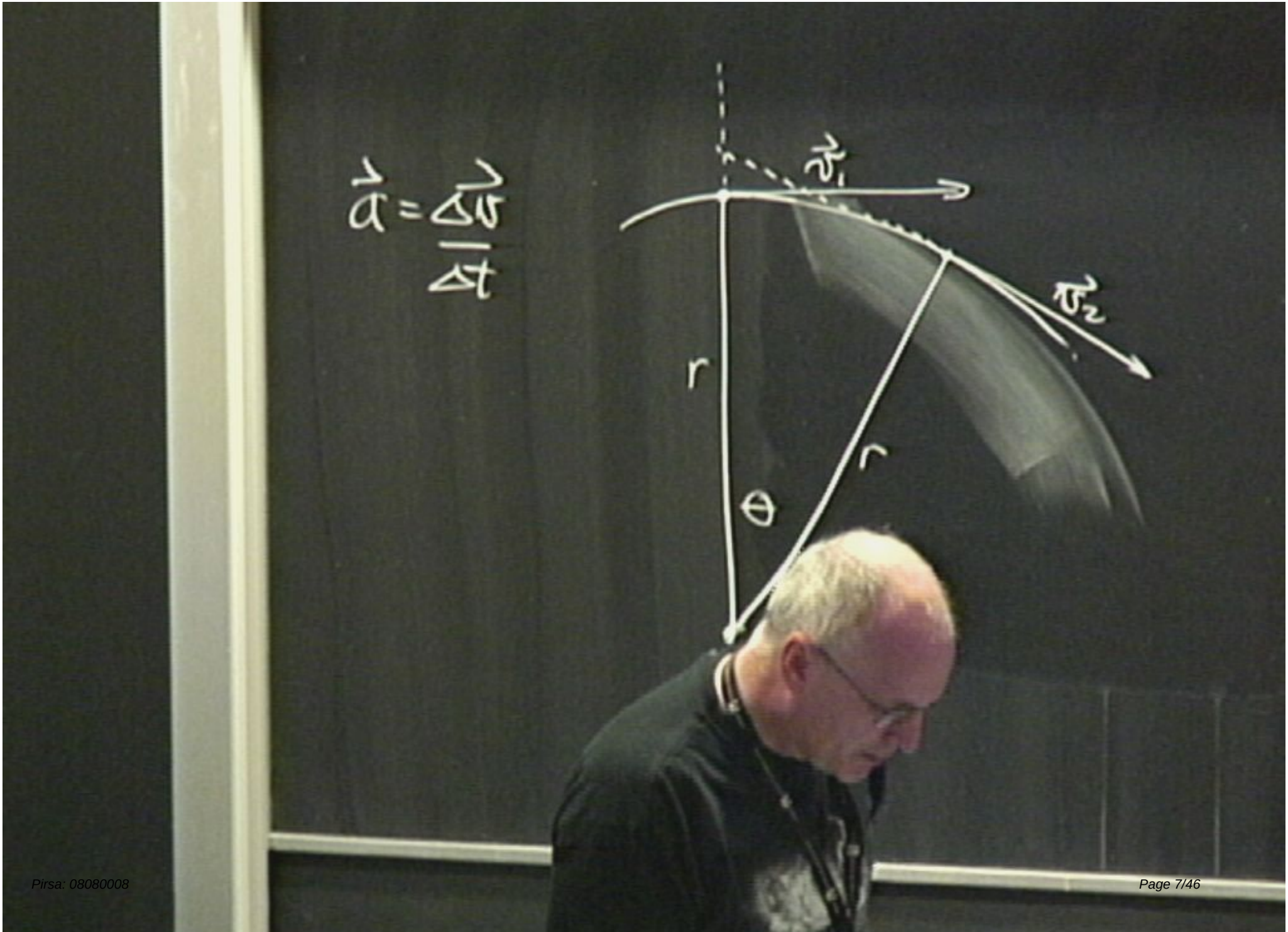
RegCure
pendulum
erimeter Wireless

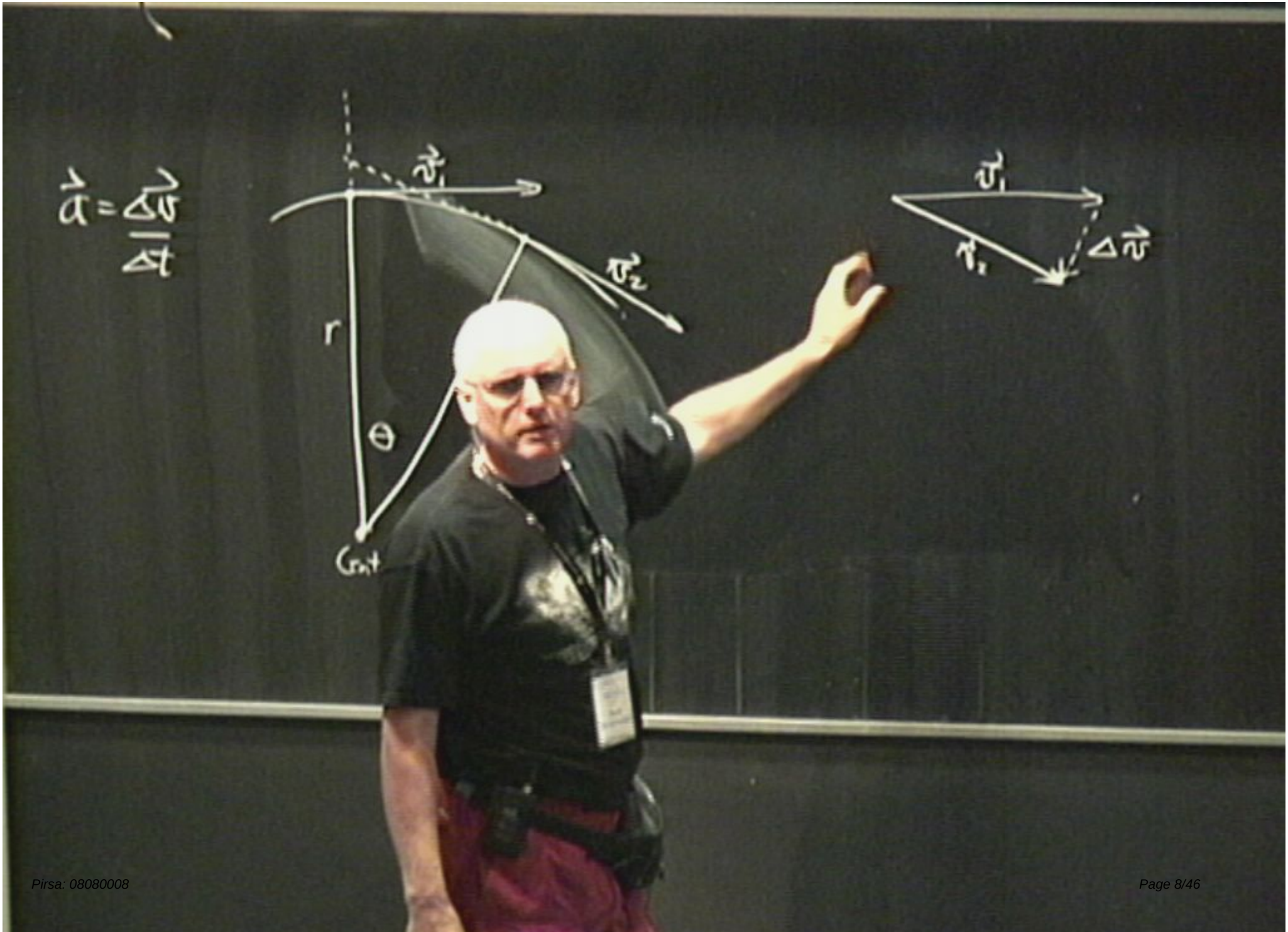

r
θ
r
Centre

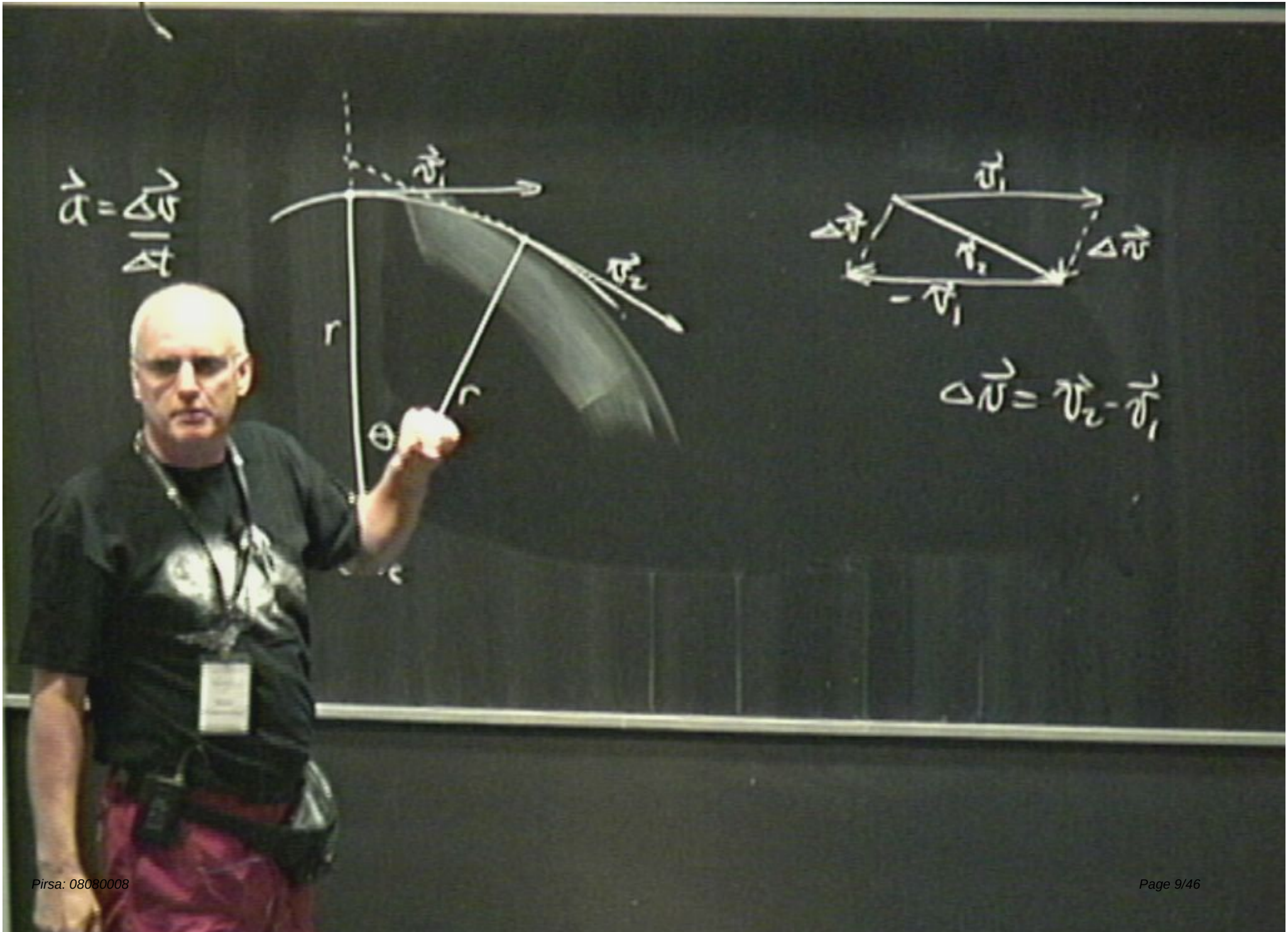

r
r
θ
Centre

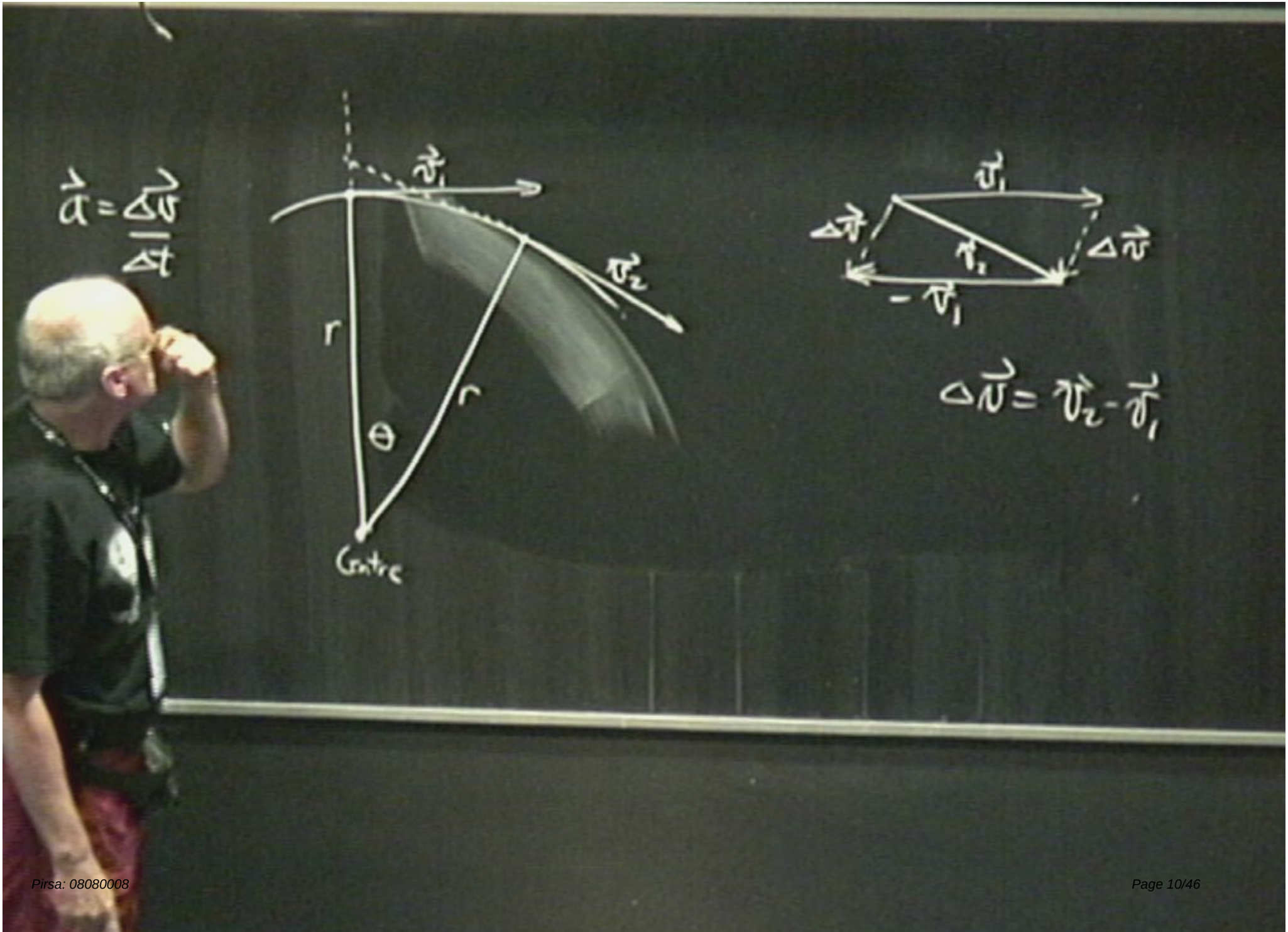

$\vec{v}_1$
$\vec{v}_2$
r
r
θ
Centre

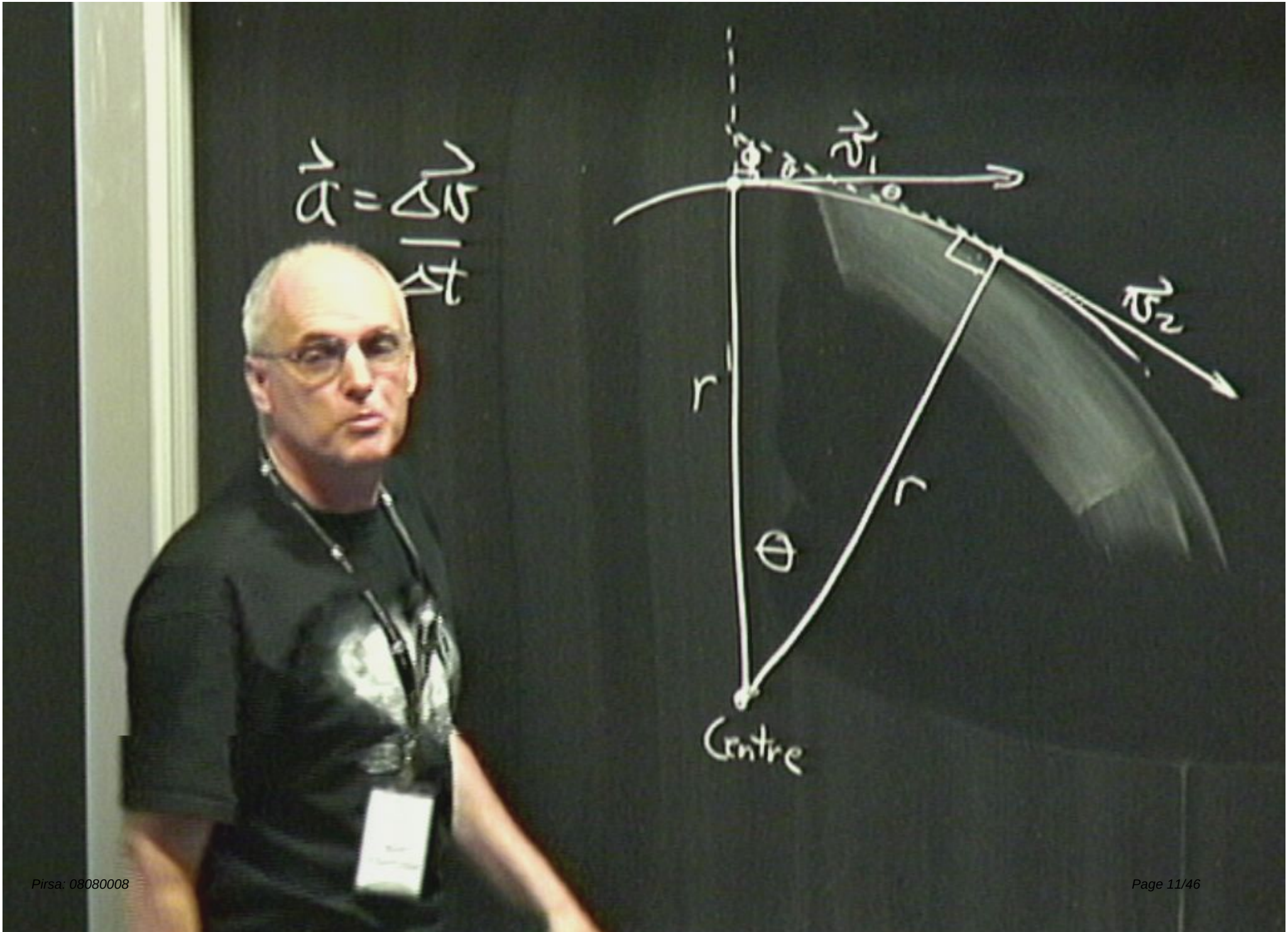

$\vec{v}_1$
$\vec{v}_2$
r
r
θ
Centre

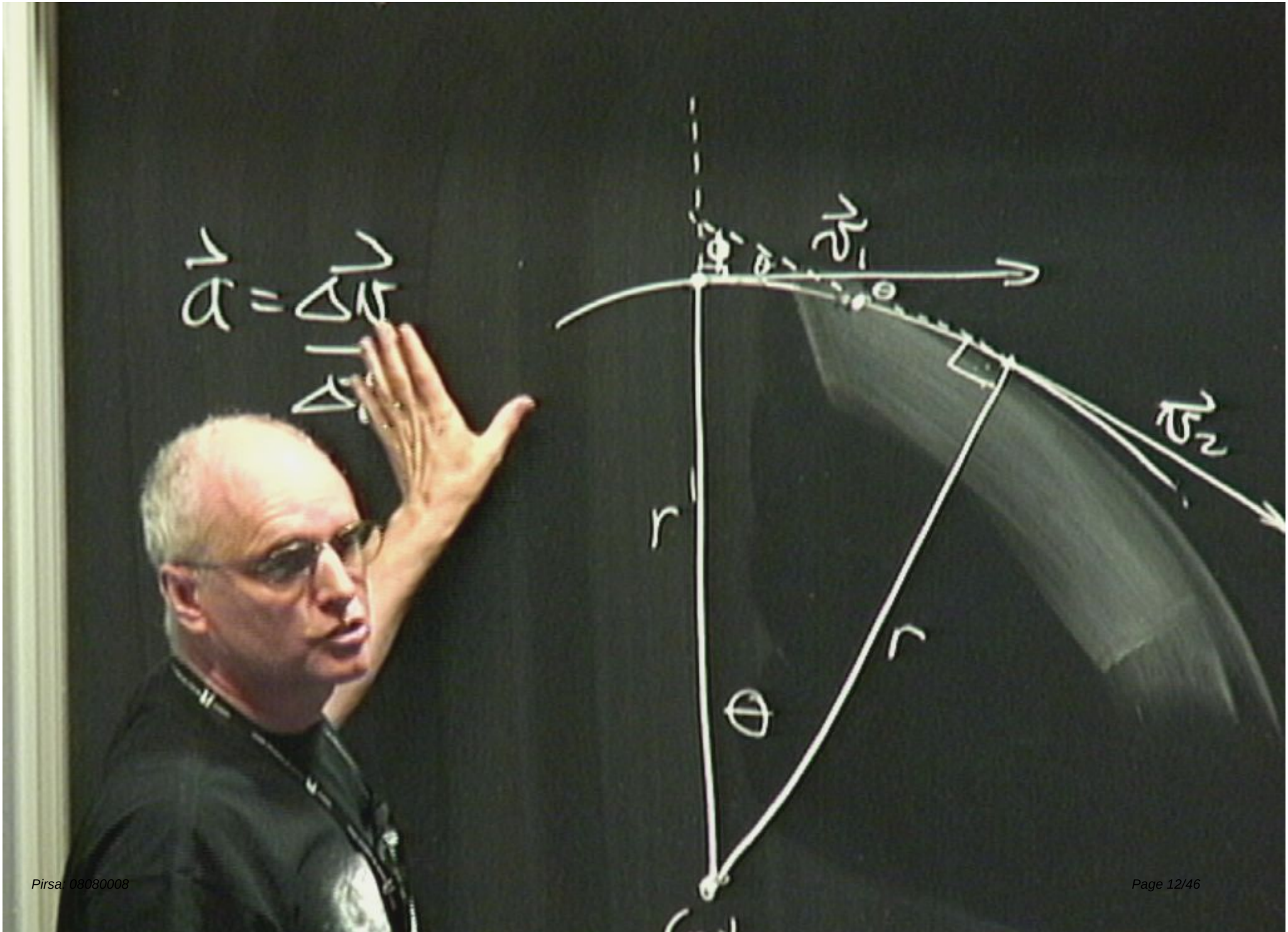

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
$\vec{v}_2$
r
r
θ

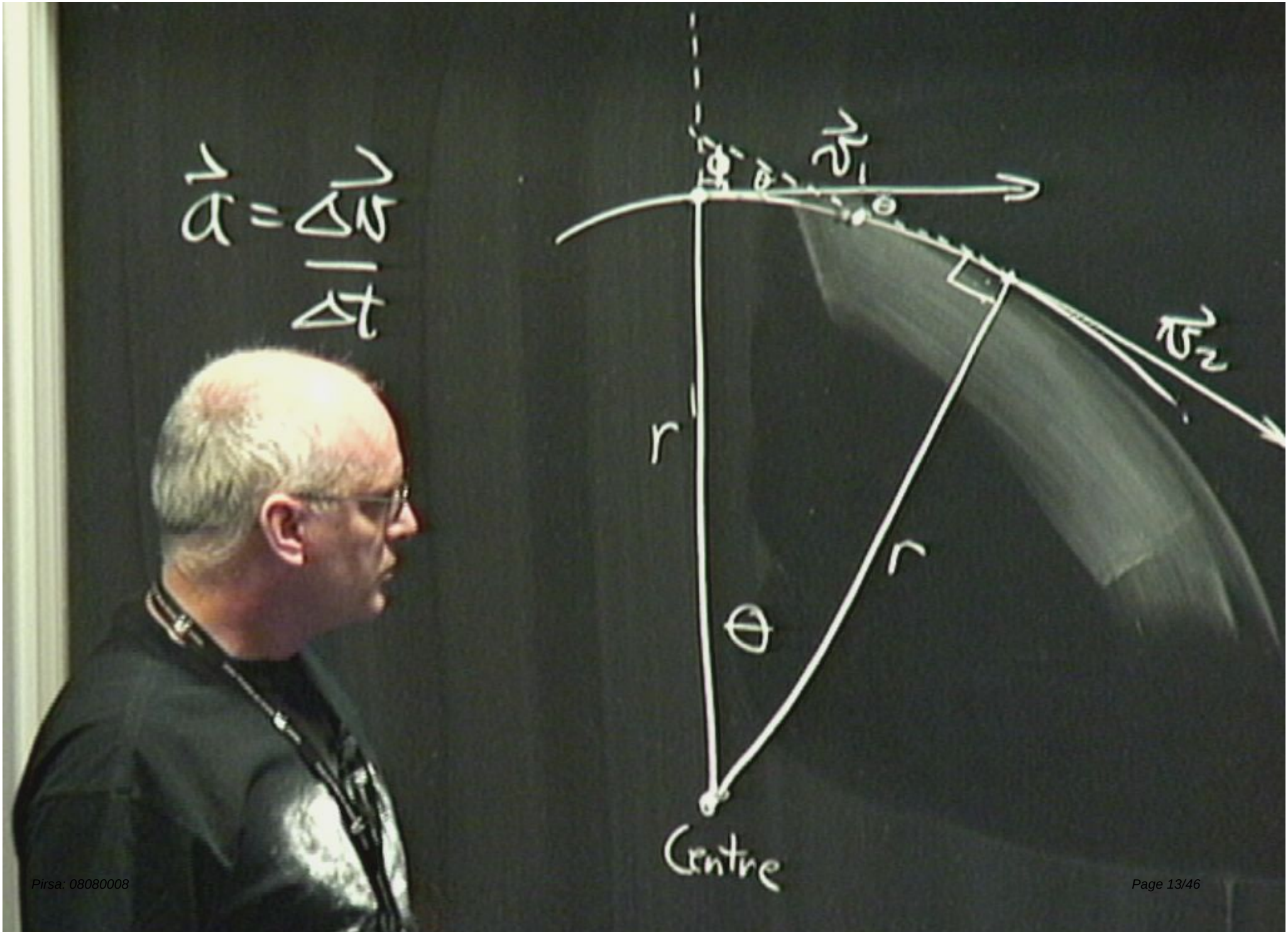

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
$\vec{v}_2$
r
θ
$\vec{v}_1$
$\vec{v}_1$
$\Delta \vec{v}$

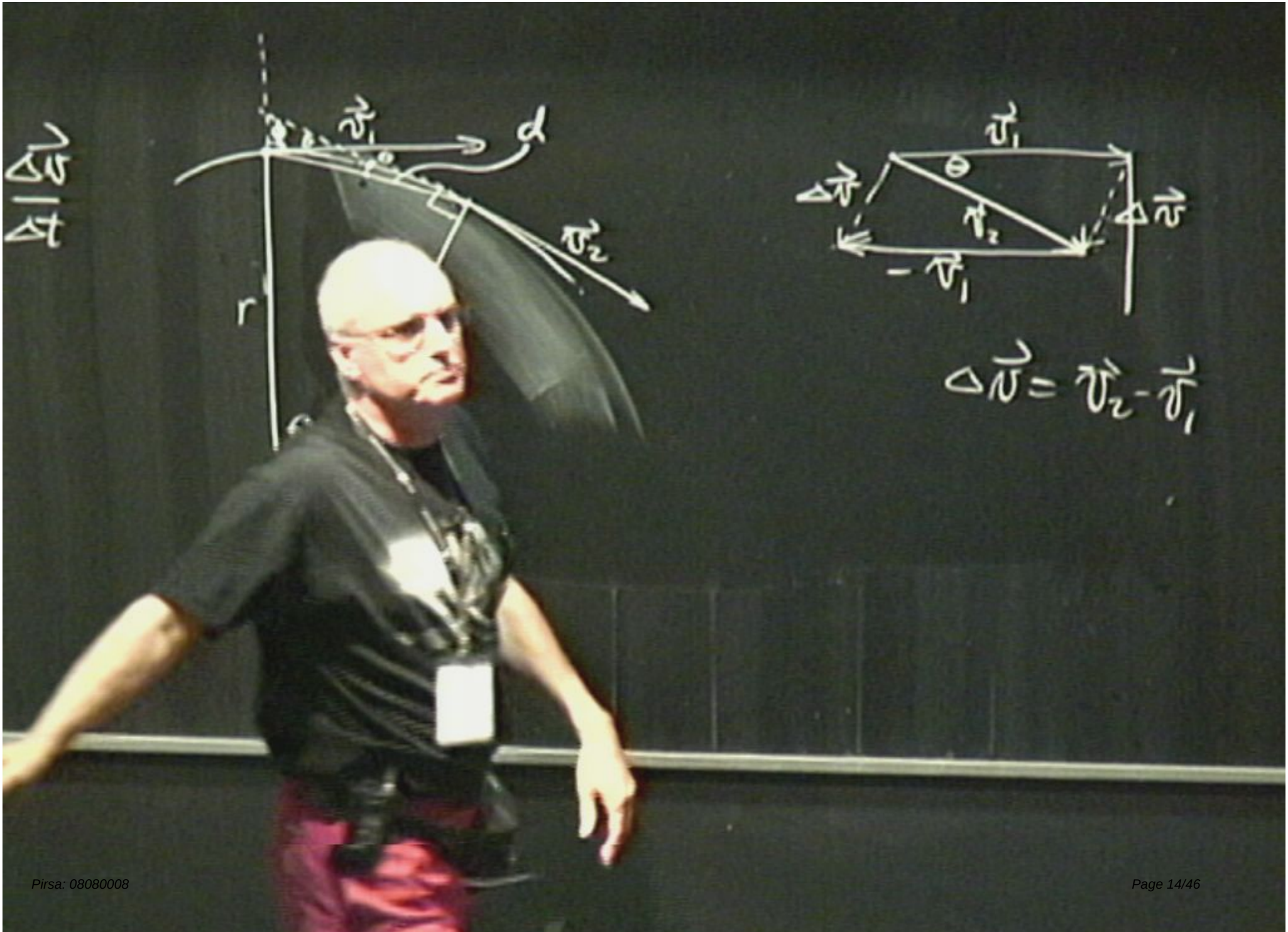

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
$\vec{v}_2$
r
r
θ
$\vec{v}_1$
$\Delta \vec{v}$
$\vec{v}_1$
$-\vec{v}_1$
$\Delta \vec{v}$
$\Delta \vec{v} = \vec{v}_2 - \vec{v}_1$

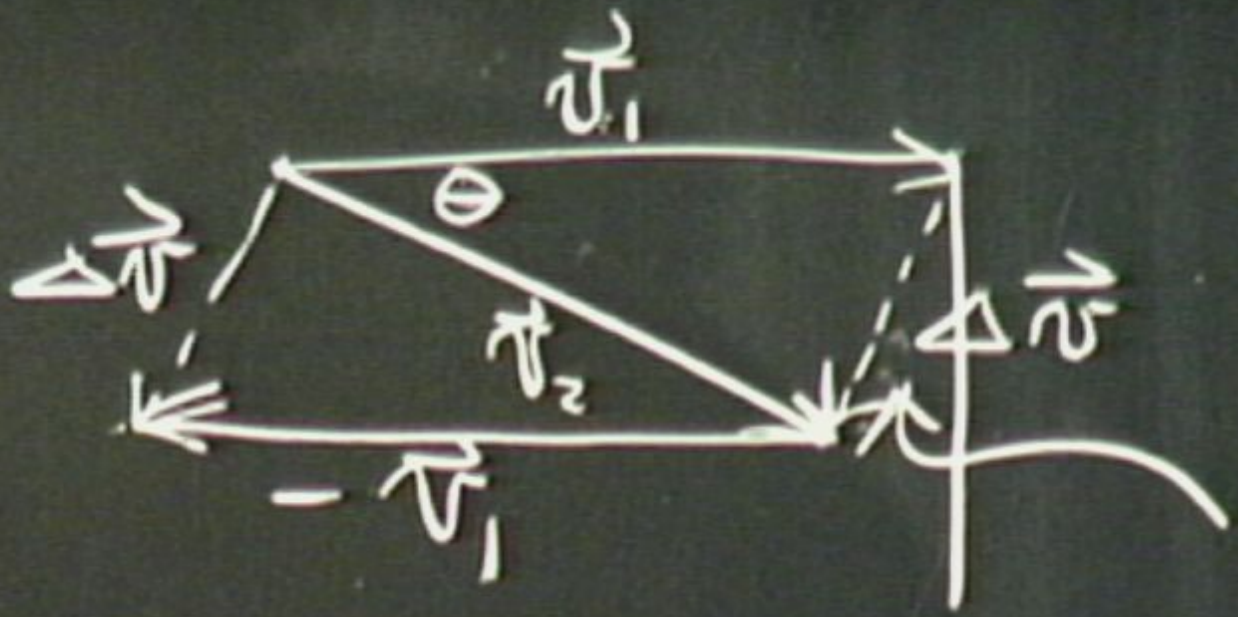

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
$\vec{v}_2$
r
θ
r
Centre
$\vec{v}_1$
$\Delta \vec{v}$
$\vec{v}_1$
$-\vec{v}_1$
$\Delta \vec{v} = \vec{v}_2 - \vec{v}_1$


$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
$\vec{v}_2$
r
r
θ
Centre

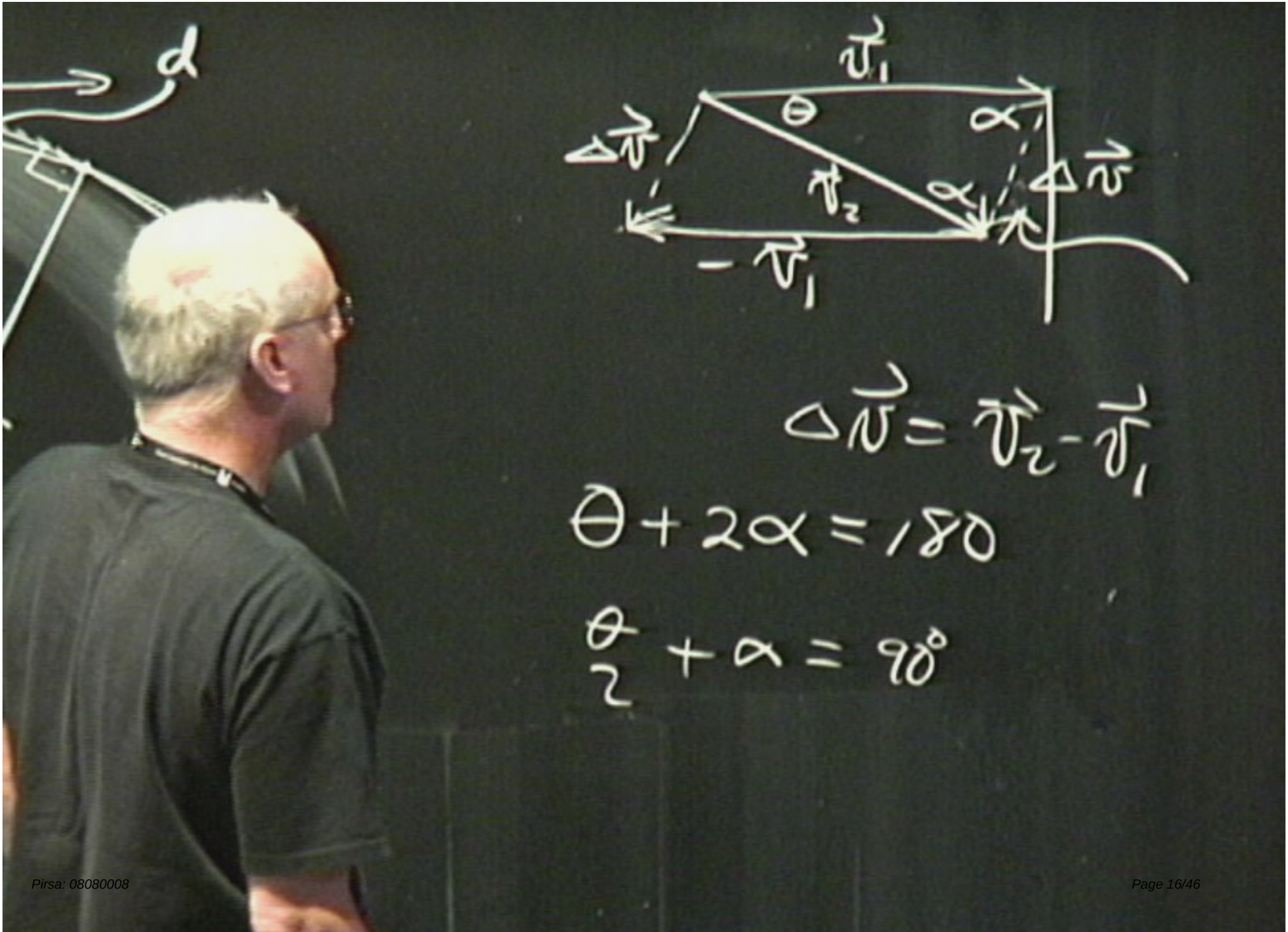

r
r
θ

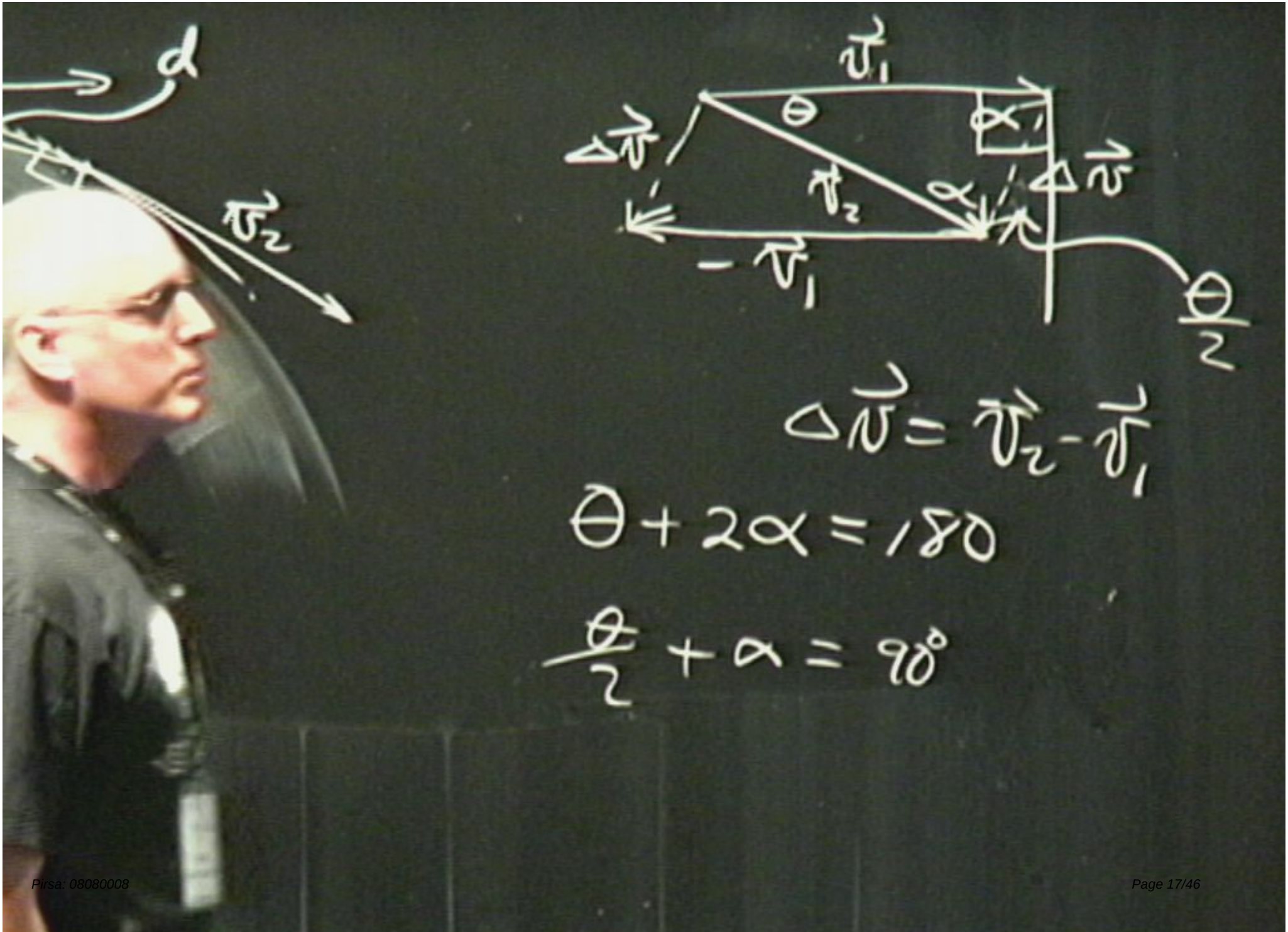

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\Delta \vec{v}$
$\vec{v}_2$
r
r
θ
Centre

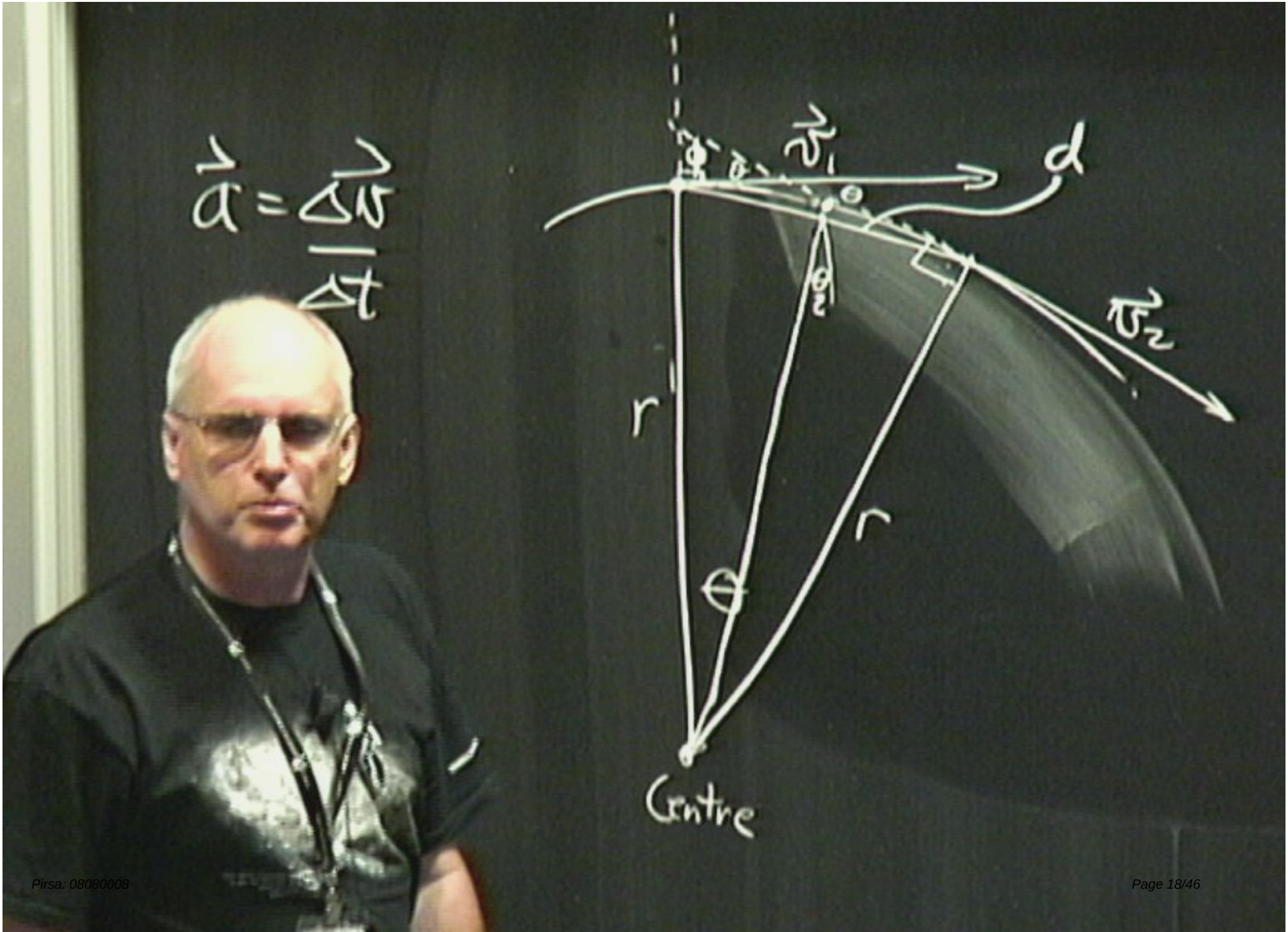

$\frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
d
$\vec{v}_2$
r
$\vec{v}_1$
$\Delta \vec{v}$
θ
$\vec{v}_2$
$\Delta \vec{v}$
$-\vec{v}_1$
$\Delta \vec{v} = \vec{v}_2 - \vec{v}_1$

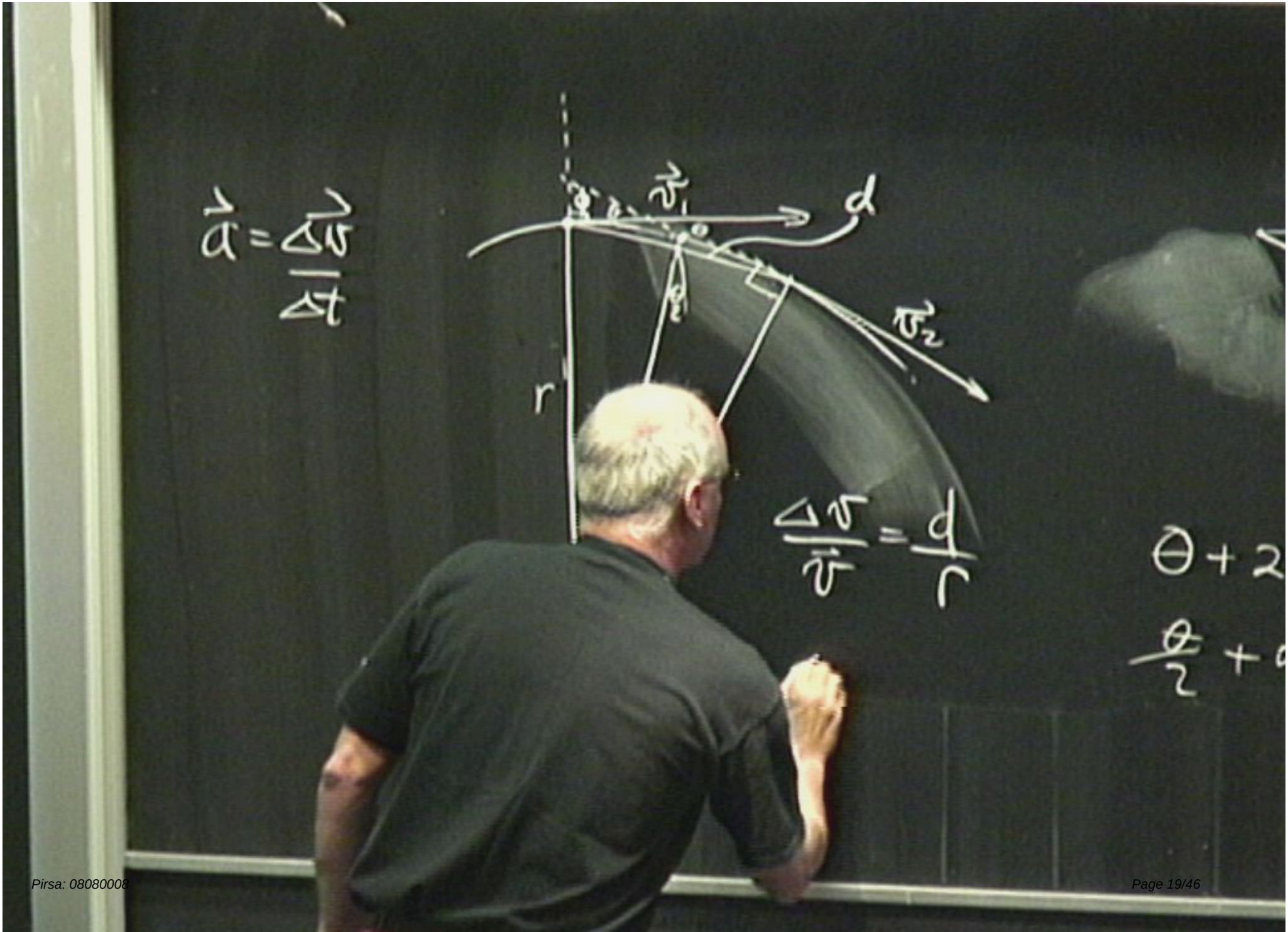


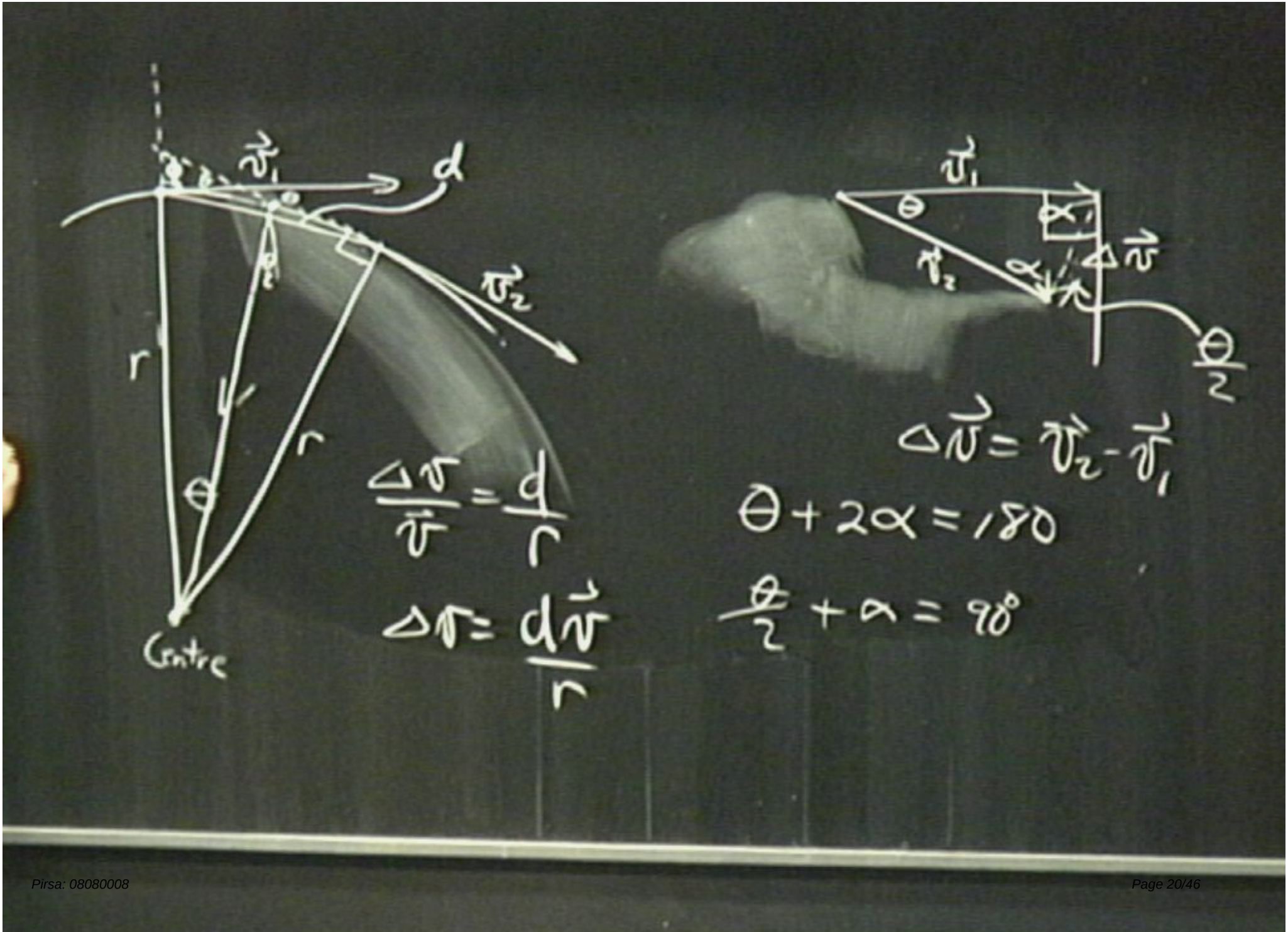
$$\Delta\vec{v} = \vec{v}_2 - \vec{v}_1$$

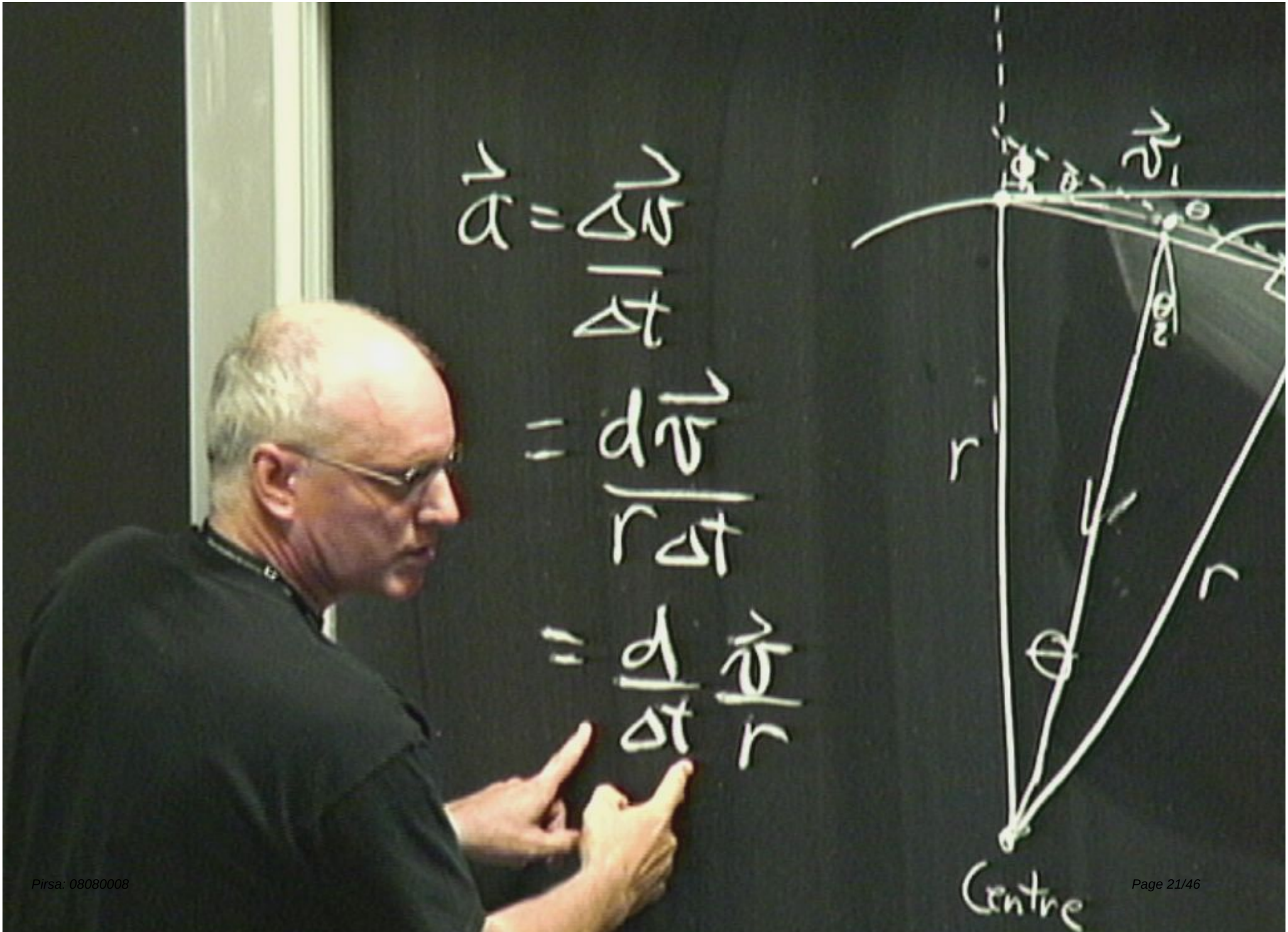

d
$\vec{v}_1$
θ
α
$\Delta\vec{v}$
$\vec{v}_2$
α
$\Delta\vec{v}$
$-\vec{v}_1$
$\Delta\vec{v} = \vec{v}_2 - \vec{v}_1$
$\theta + 2\alpha = 180$
$\frac{\theta}{2} + \alpha = 90^\circ$

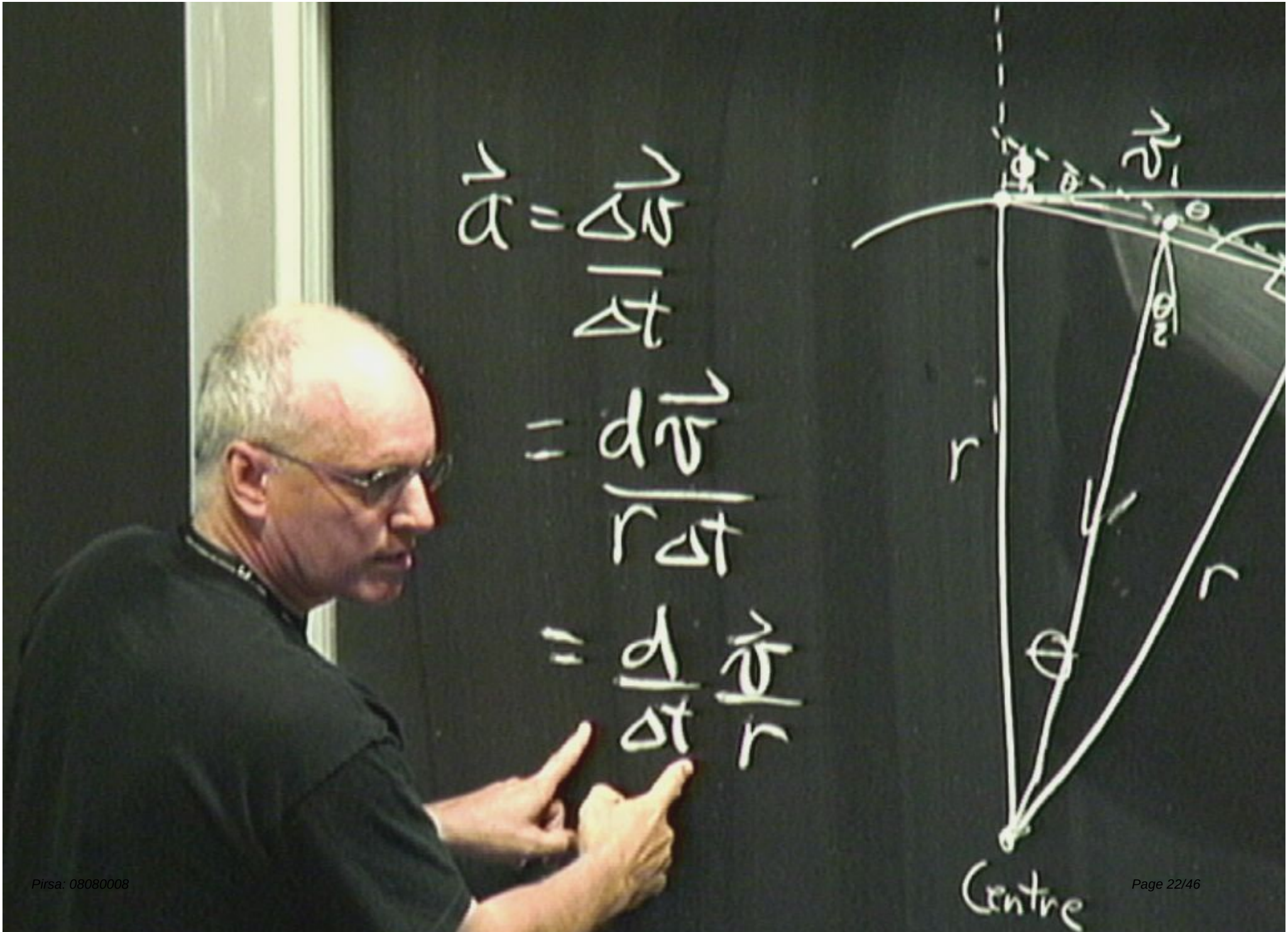

d
$\vec{v}_2$
$\vec{v}_1$
θ
α
$\Delta\vec{v}$
$\vec{v}_2$
α
$\Delta\vec{v}$
$-\vec{v}_1$
$\frac{\theta}{2}$
$\Delta\vec{v} = \vec{v}_2 - \vec{v}_1$
$\theta + 2\alpha = 180$
$\frac{\theta}{2} + \alpha = 90^\circ$

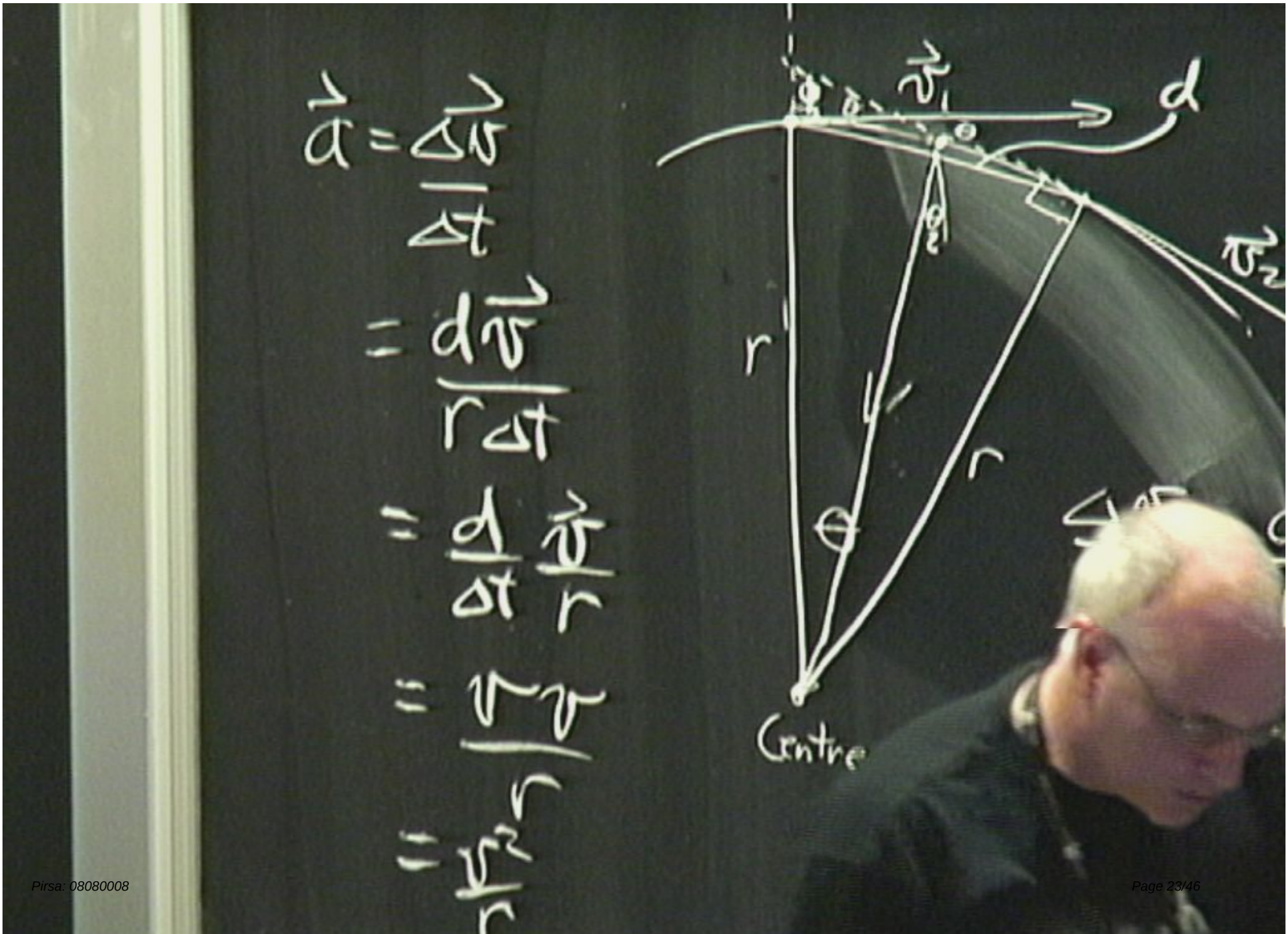

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
d
θ
θ_2
$\vec{v}_2$
r
r
θ
Centre

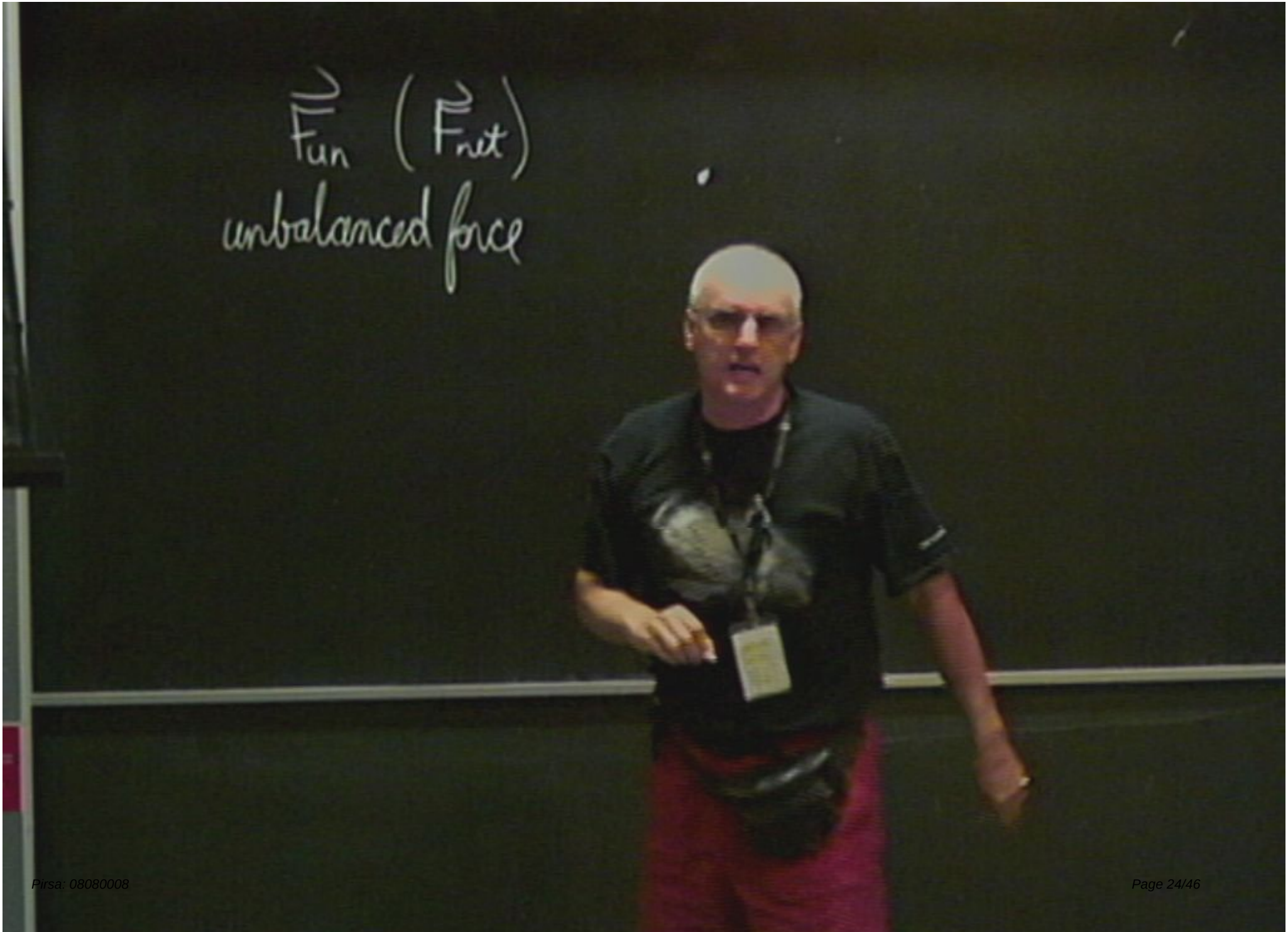

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$\vec{v}_1$
d
$\vec{v}_2$
r
$\frac{\Delta v}{v} = \frac{d}{r}$
$\theta + 2$
$\frac{\theta}{2} +$

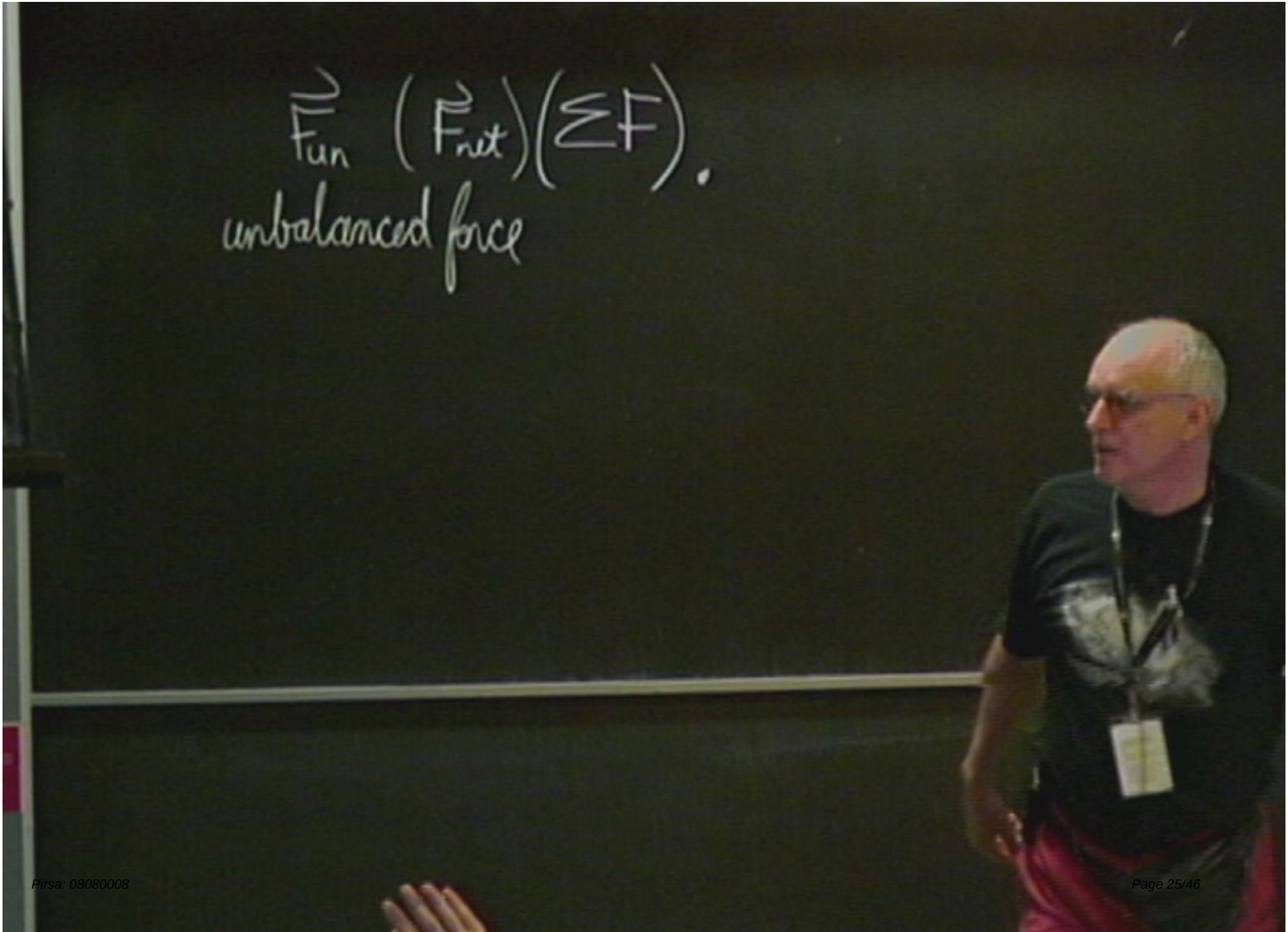

$\vec{v}_1$
d
$\vec{v}_2$
r
r
θ
Centre
$\frac{\Delta v}{v} = \frac{d}{r}$
$\Delta \vec{v} = \frac{d\vec{v}}{r}$
$\vec{v}_1$
θ
$\vec{v}_2$
α
$\Delta \vec{v}$
$\frac{\theta}{2}$
$\Delta \vec{v} = \vec{v}_2 - \vec{v}_1$
$\theta + 2\alpha = 180$
$\frac{\theta}{2} + \alpha = 90°$

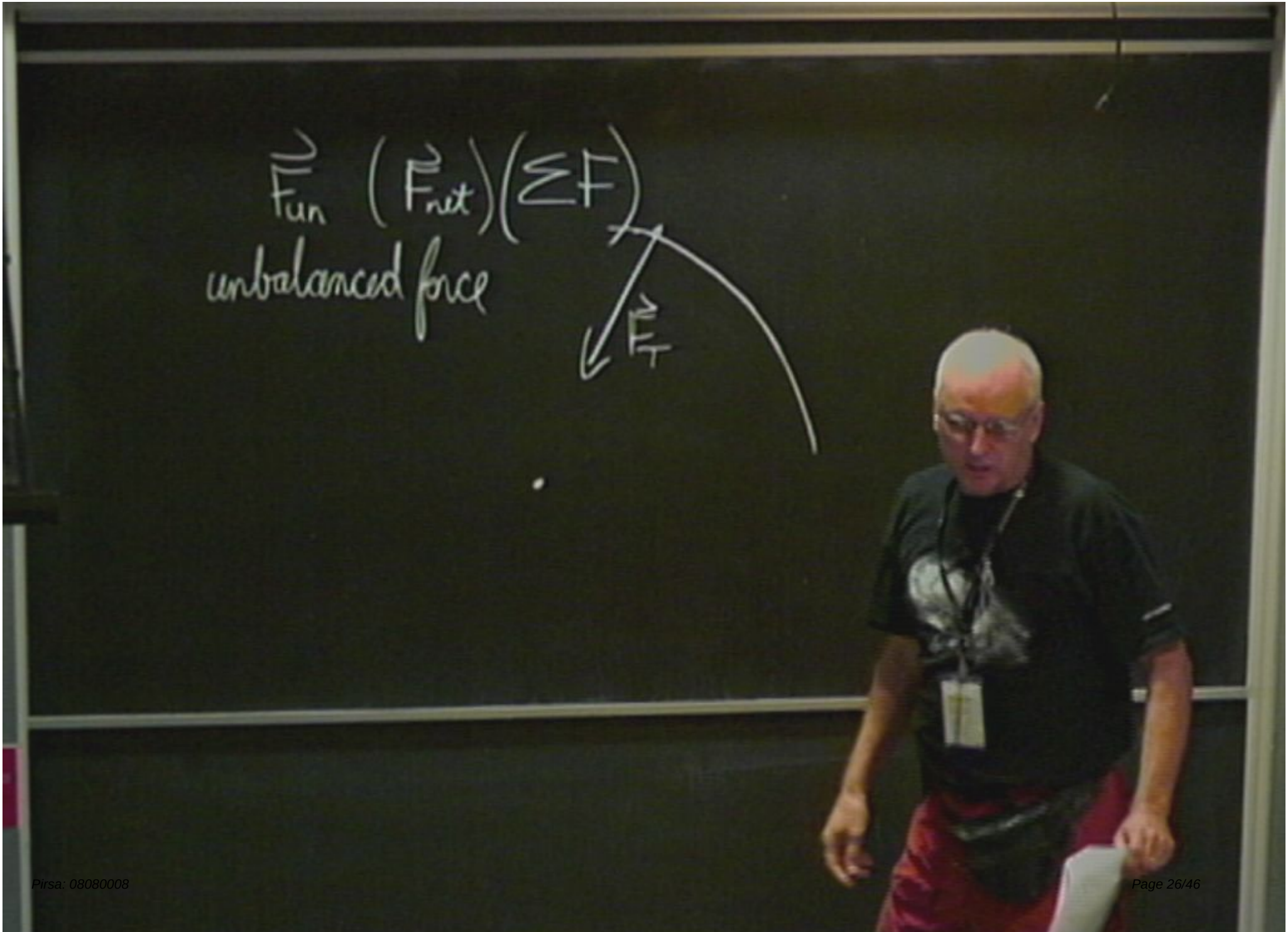

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$= \frac{d\vec{v}}{r\,\Delta t}$
$= \frac{d}{dt}\frac{\vec{v}}{r}$
r
r
Centre

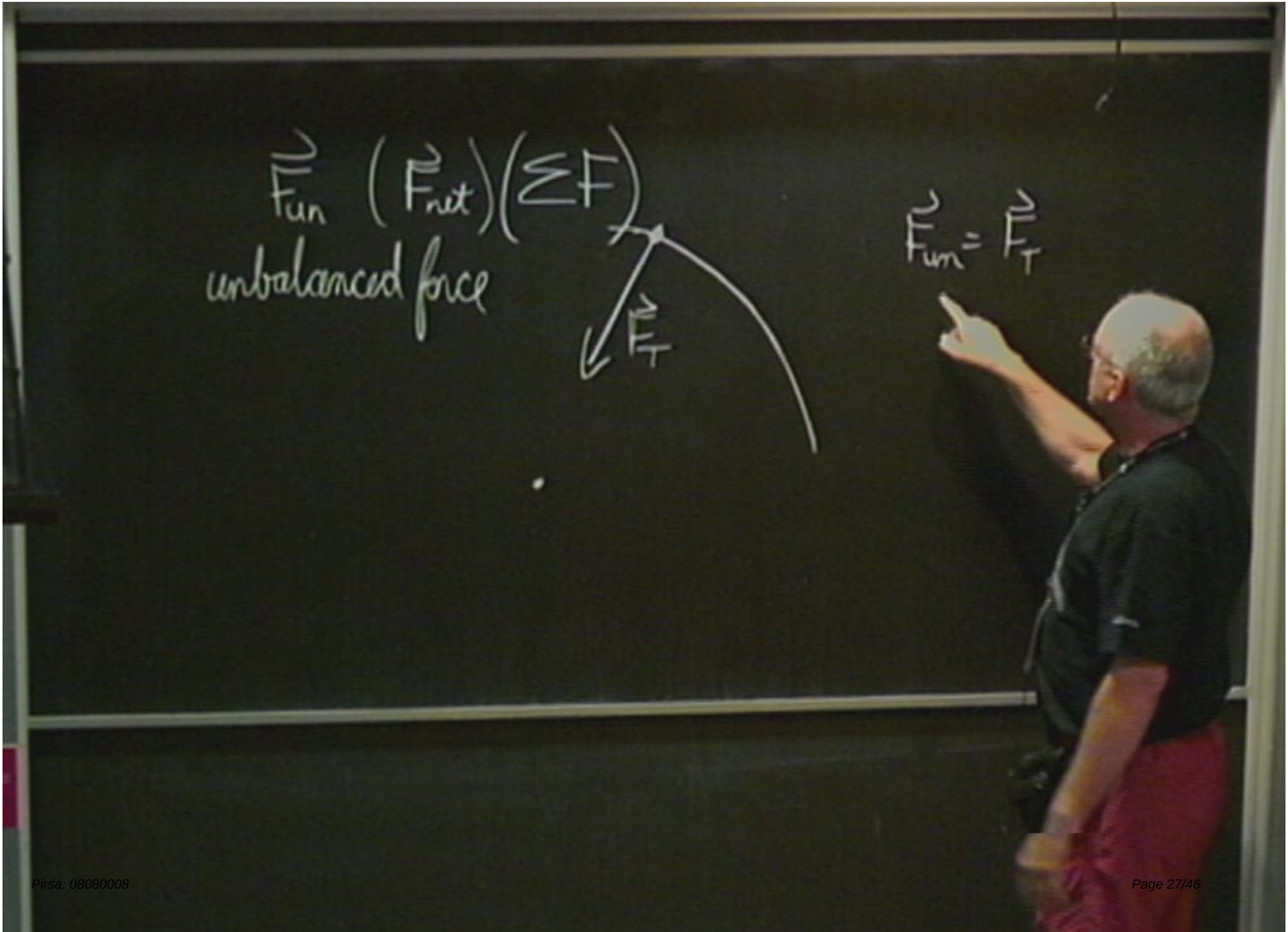

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$= \frac{d\vec{v}}{r\,\Delta t}$
$= \frac{d}{\Delta t}\frac{\vec{v}}{r}$
$\vec{v}_1$
θ
θ_2
r
r
Centre

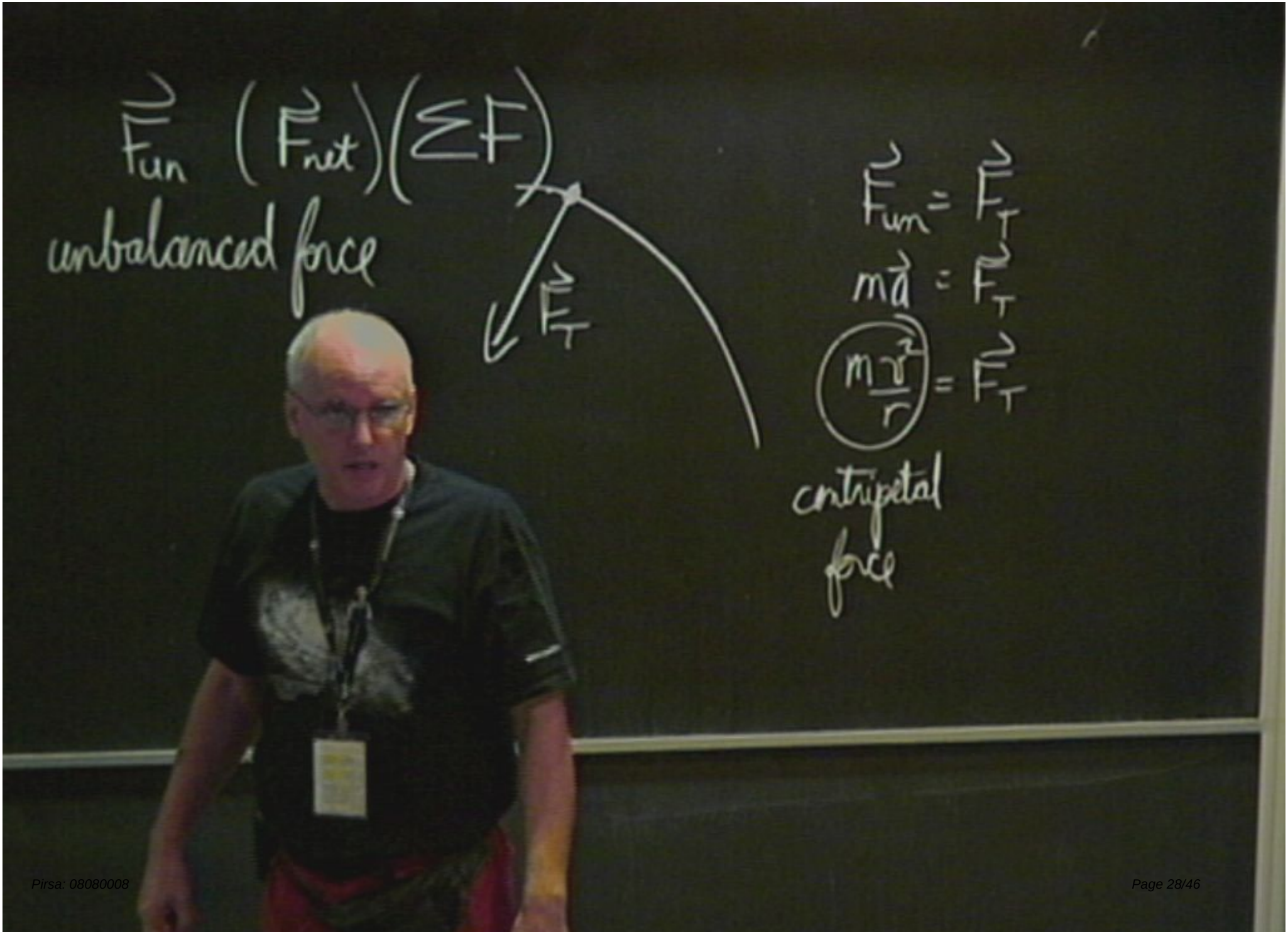

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$
$= \frac{d\vec{v}}{r\,\Delta t}$
$= \frac{d}{\Delta t}\frac{\vec{v}}{r}$
$= \frac{v}{r}\vec{v}$
$= \frac{v^2}{r}$
$\vec{v}_1$
d
$\vec{v}_2$
r
θ
r
Centre

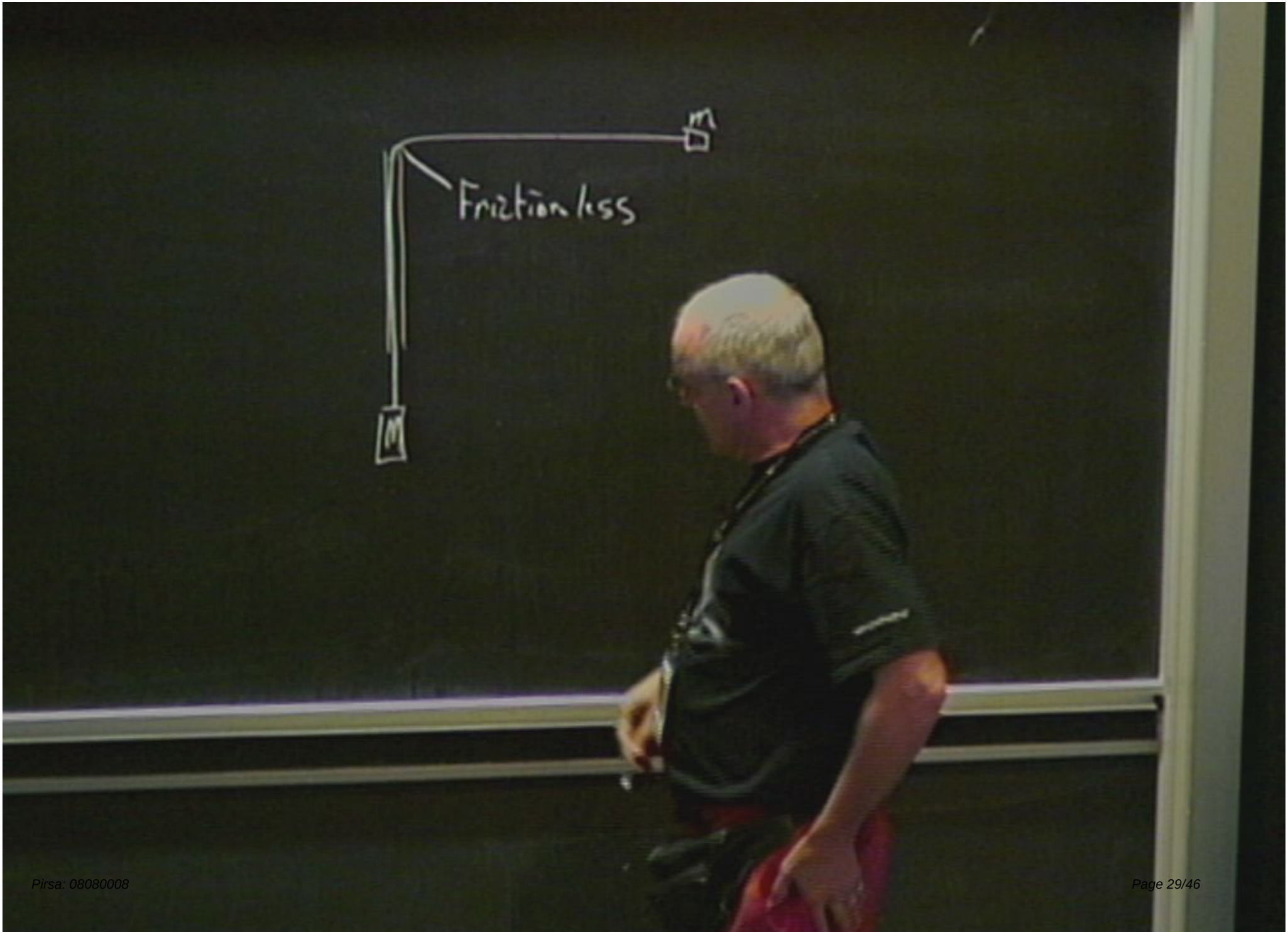

$\vec{F}_{un}$ ($\vec{F}_{net}$)
unbalanced force

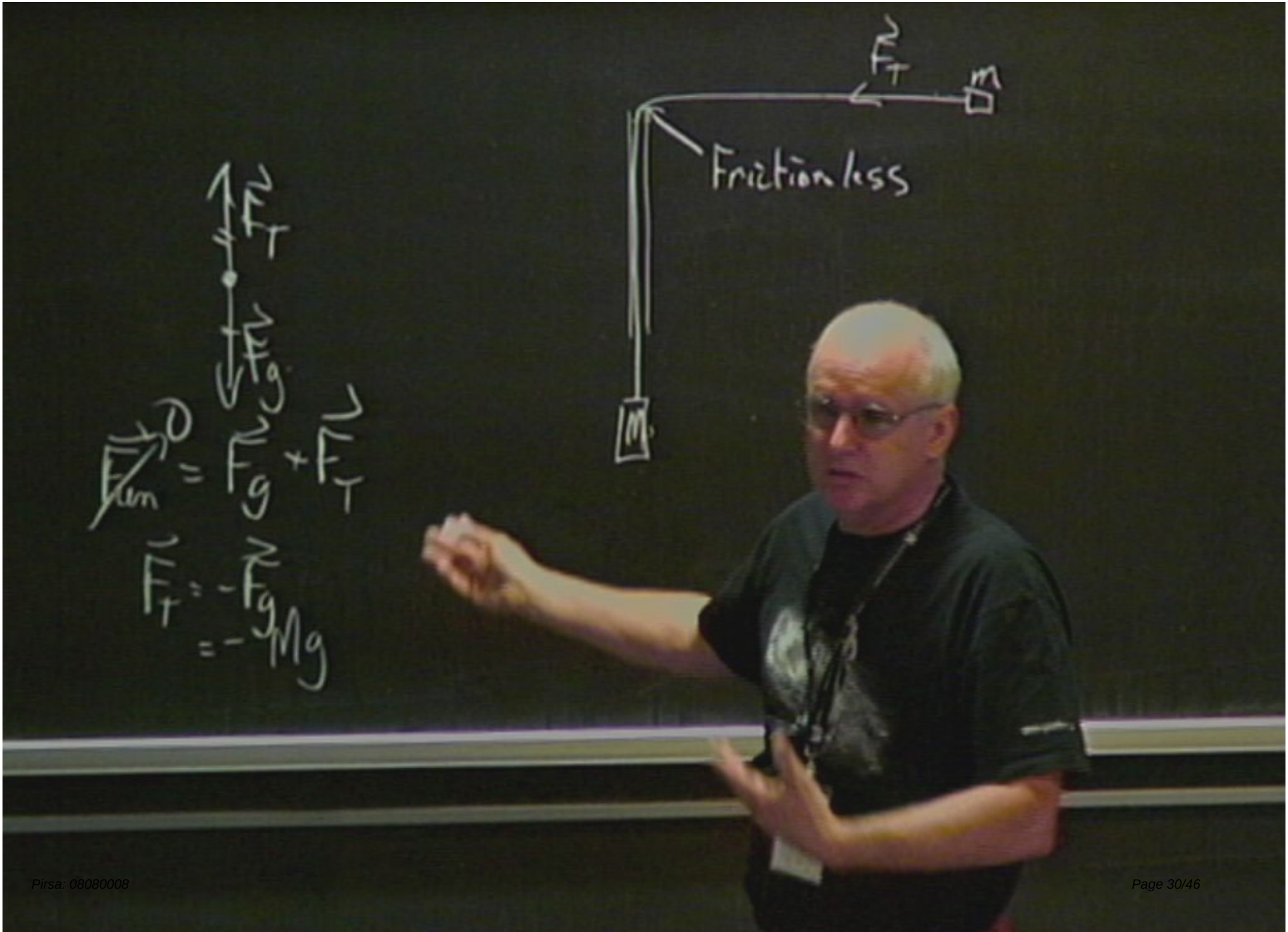

$\vec{F}_{un}$ ($\vec{F}_{net}$) (ΣF).
unbalanced force

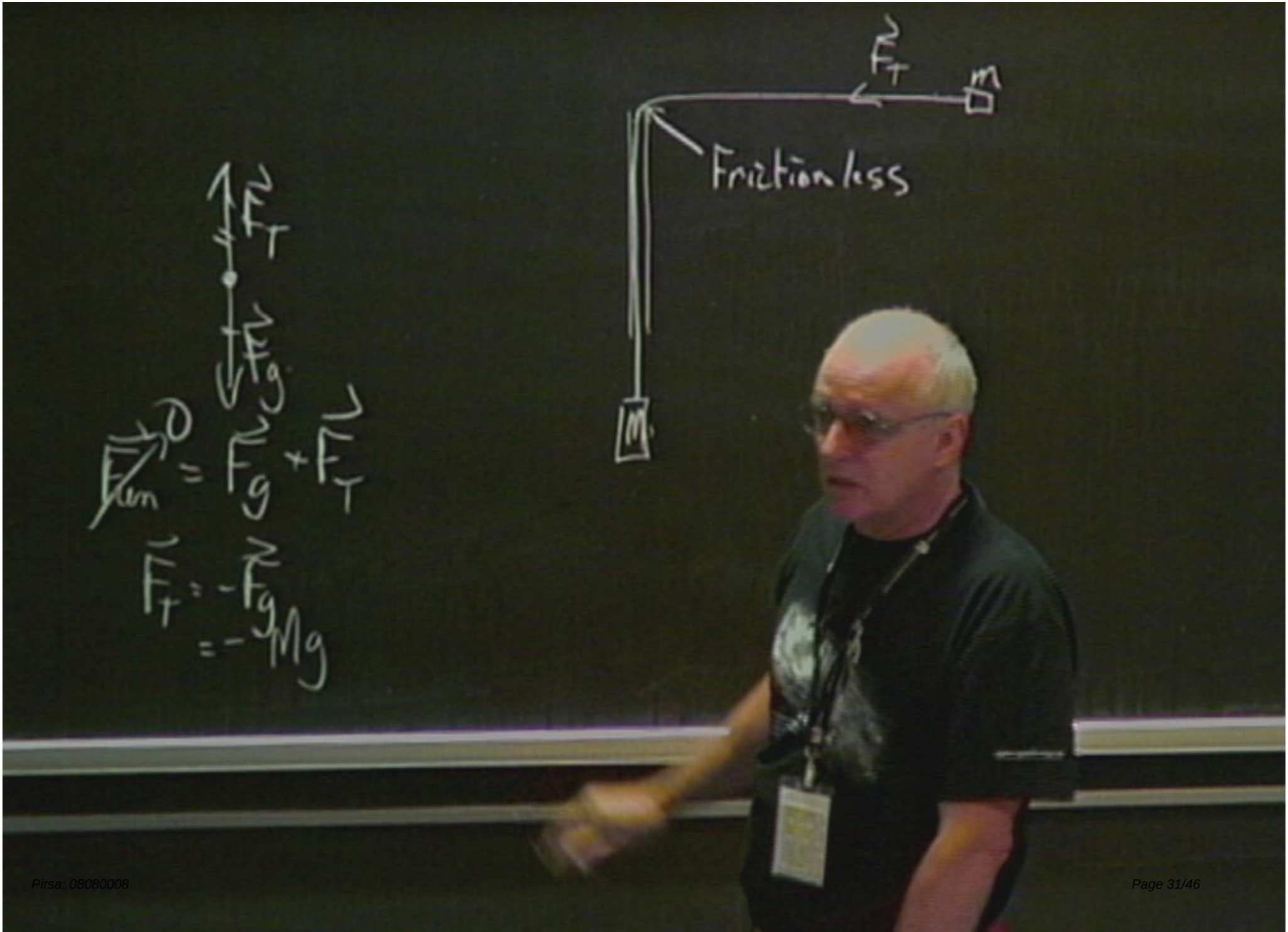

$\vec{F}_{un}$ $(\vec{F}_{net})(\Sigma F)$
unbalanced force
$\vec{F}_T$

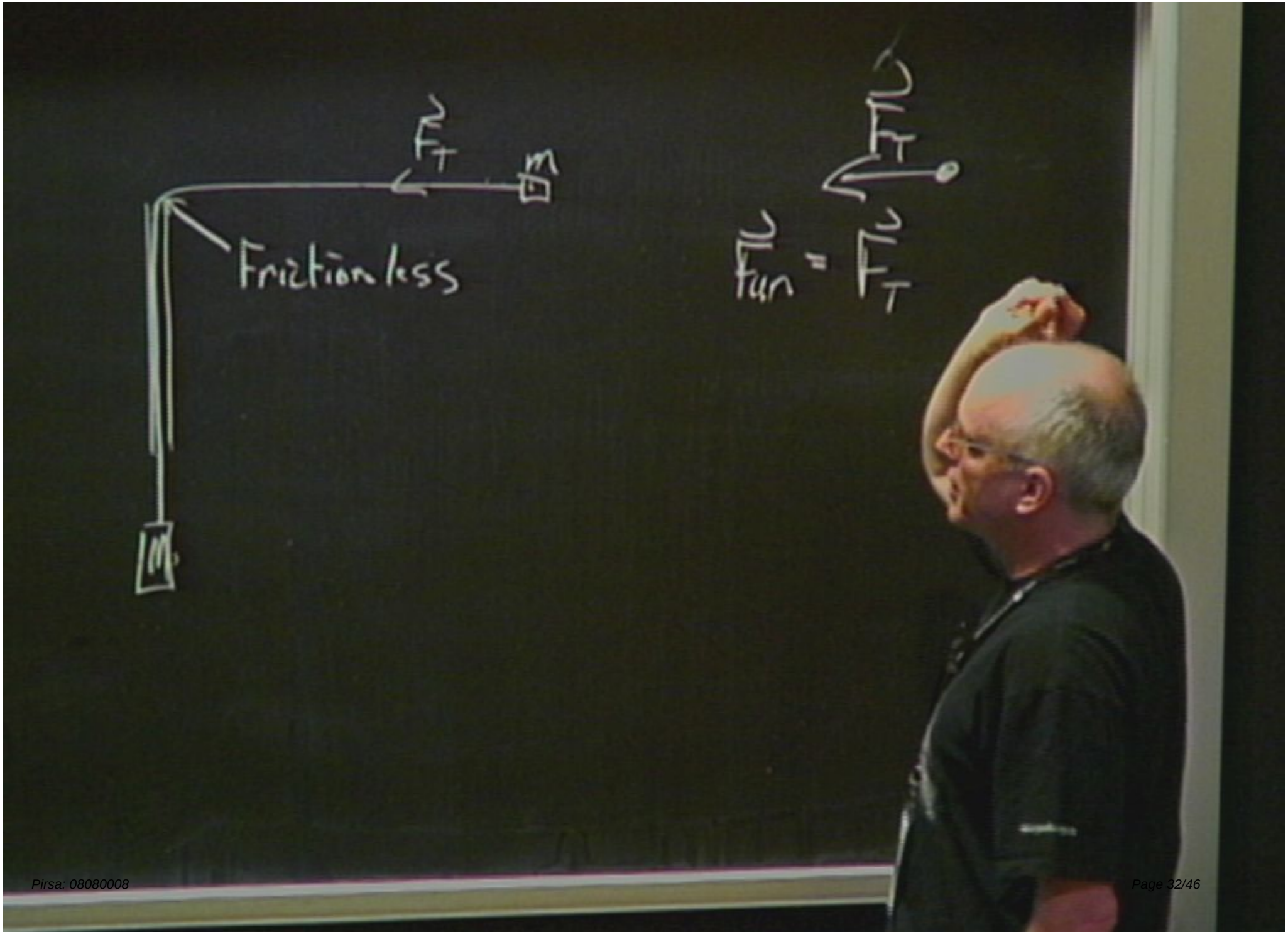

$\vec{F}_{un}$ $(\vec{F}_{net})(\Sigma F)$
unbalanced force
$\vec{F}_T$
$\vec{F}_{un} = \vec{F}_T$

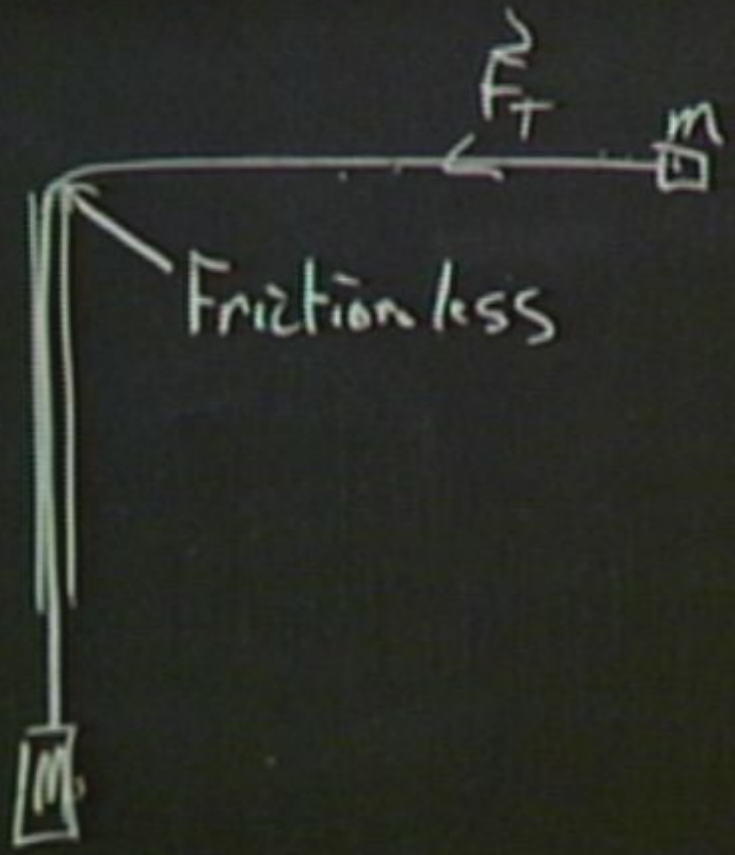

$\vec{F}_{un}$ ($\vec{F}_{net}$) ($\Sigma \vec{F}$)
unbalanced force
$\vec{F}_T$
$\vec{F}_{un} = \vec{F}_T$
$m\vec{a} = \vec{F}_T$
$\frac{mv^2}{r} = \vec{F}_T$
centripetal force


m
Friction less
M


$\vec{F}_T$
m
Frictionless
$\vec{F}_T$
$\vec{F}_g$
$\sum \vec{F} = 0$
$\vec{F}_{net} = \vec{F}_g + \vec{F}_T$
$\vec{F}_T = -\vec{F}_g$
$= -Mg$


$\vec{F}_T$
m
Friction less
M
$\vec{F}_T$
$\vec{F}_g$
$\sum \vec{F} = 0$
$\vec{F}_{tot} = \vec{F}_g + \vec{F}_T$
$\vec{F}_T = -\vec{F}_g$
$= -Mg$


F_T
m
Frictionless
M
$F_{hand} = F_T$



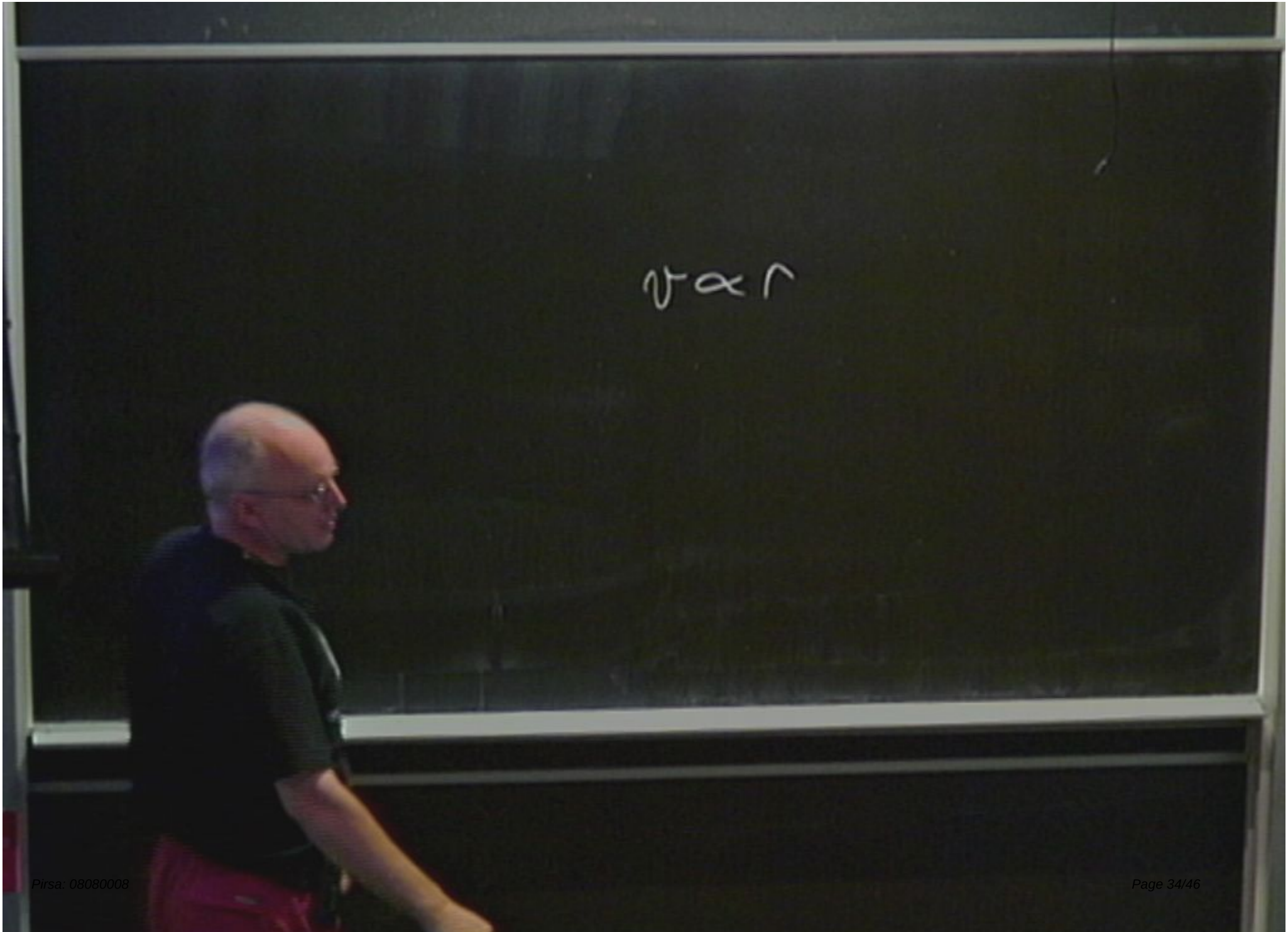
$$\vec{F}_{un} = \vec{F}_T$$

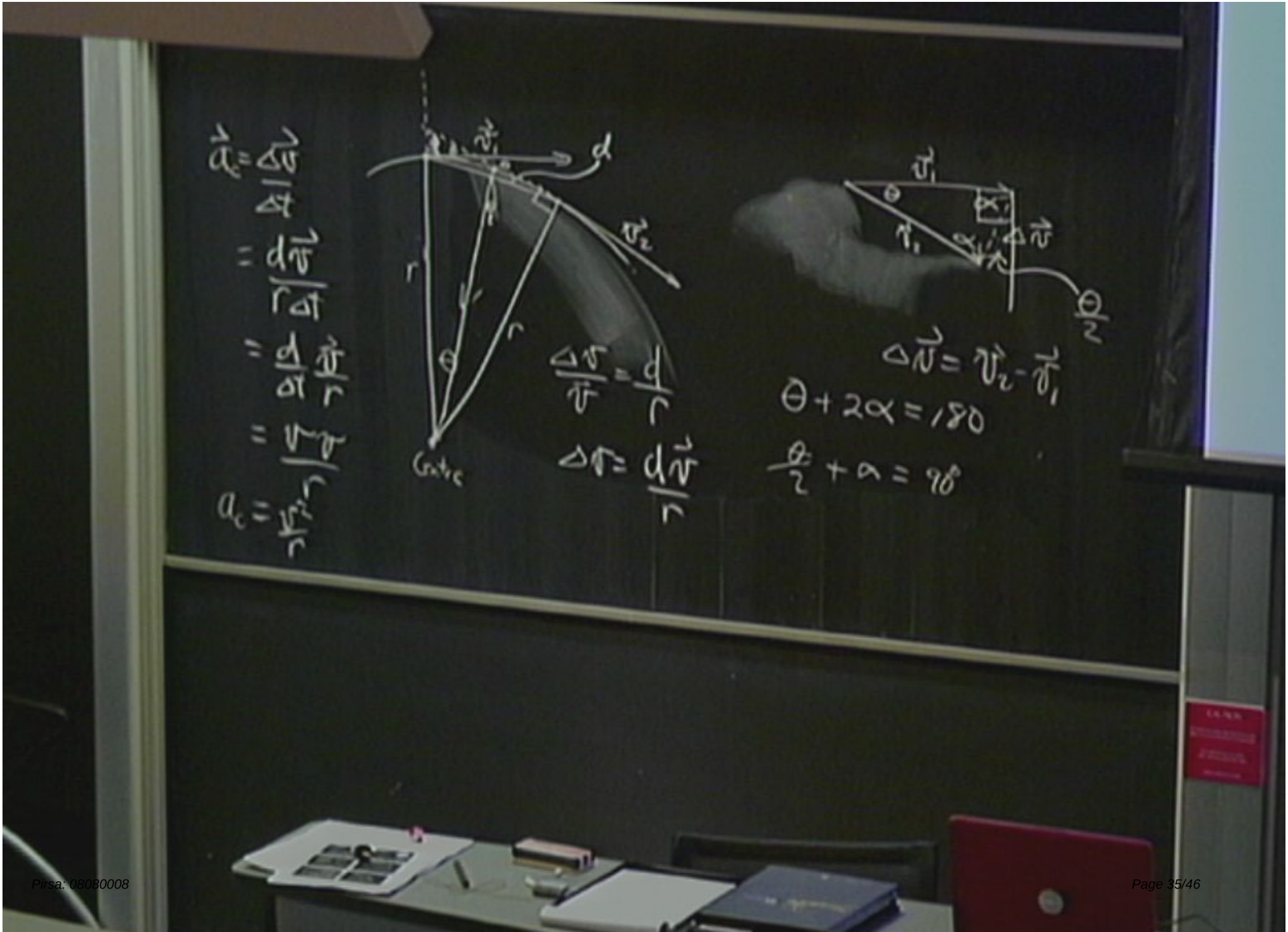
$$ma_c = F_T$$

$$\frac{mv^2}{r} = Mg$$

$$v^2 = M$$

$$v = \sqrt{M}$$


var


$\vec{a}_c = \frac{\Delta \vec{v}}{\Delta t}$
$= \frac{d\vec{v}}{r\,d\theta}$
$= \frac{d}{d\theta}\frac{\vec{x}}{r}$
$= \frac{v}{r}$
$a_c = \frac{v^2}{r}$
$\frac{\Delta v}{v} = \frac{d}{r}$
$\Delta \vec{v} = \frac{d\vec{v}}{r}$
$\Delta \vec{v} = \vec{v}_2 - \vec{v}_1$
$\theta + 2\alpha = 180$
$\frac{\theta}{2} + \alpha = 90$

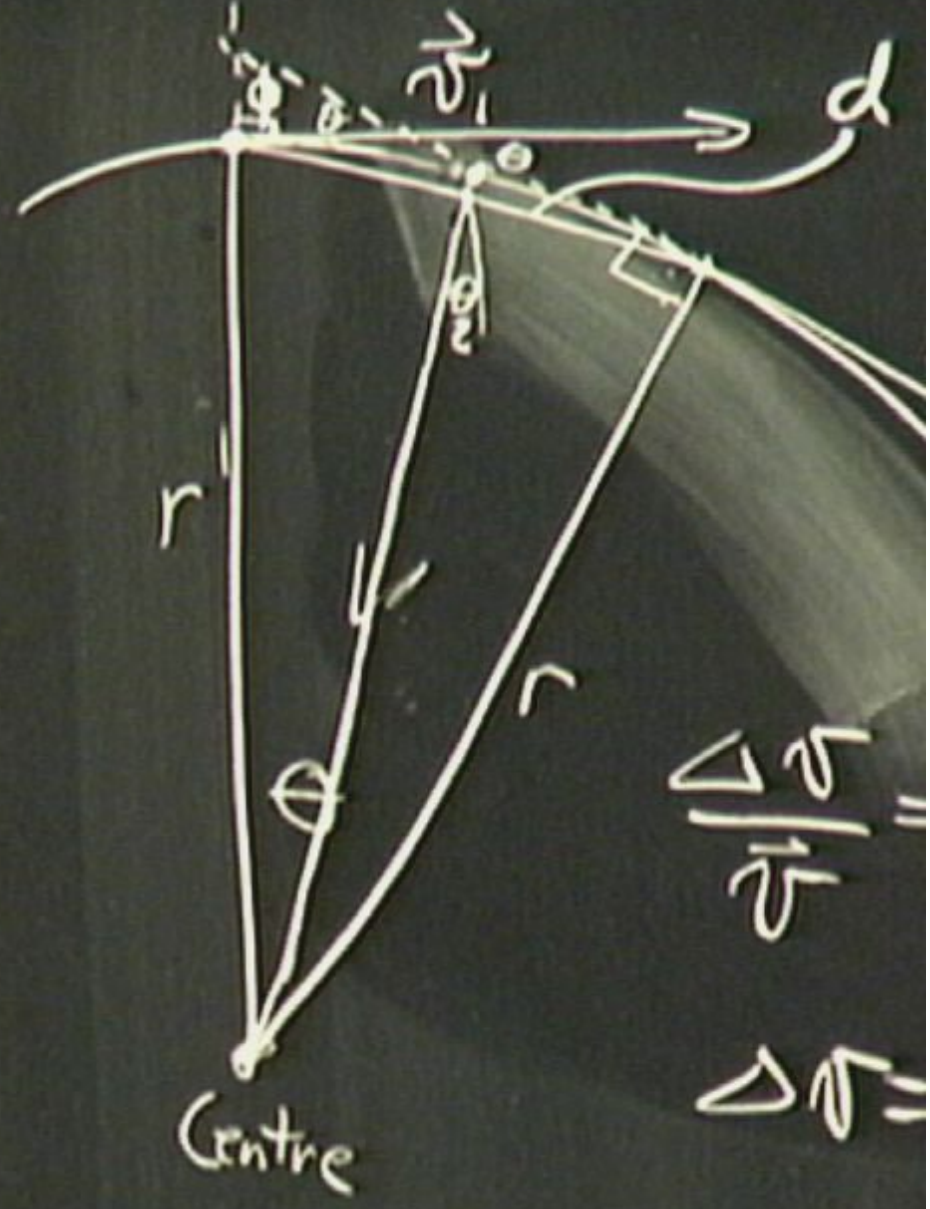
$$\vec{a}_c = \frac{\Delta \vec{v}}{\Delta t}$$

$$= \frac{d\vec{v}}{r\,\Delta t}$$

$$= \frac{d}{\Delta t}\frac{\vec{v}}{r}$$

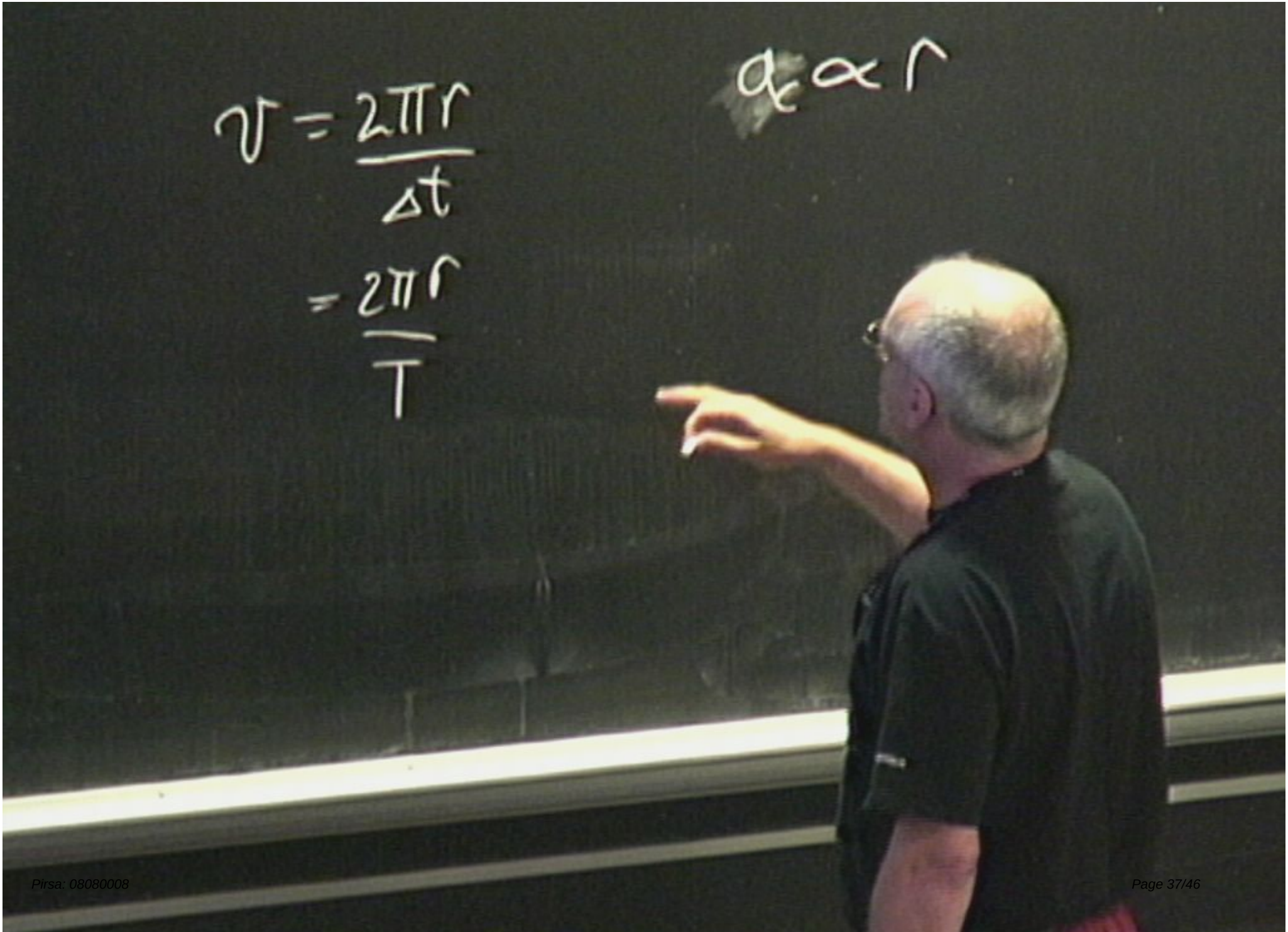
$$= \frac{v\,v}{r}$$

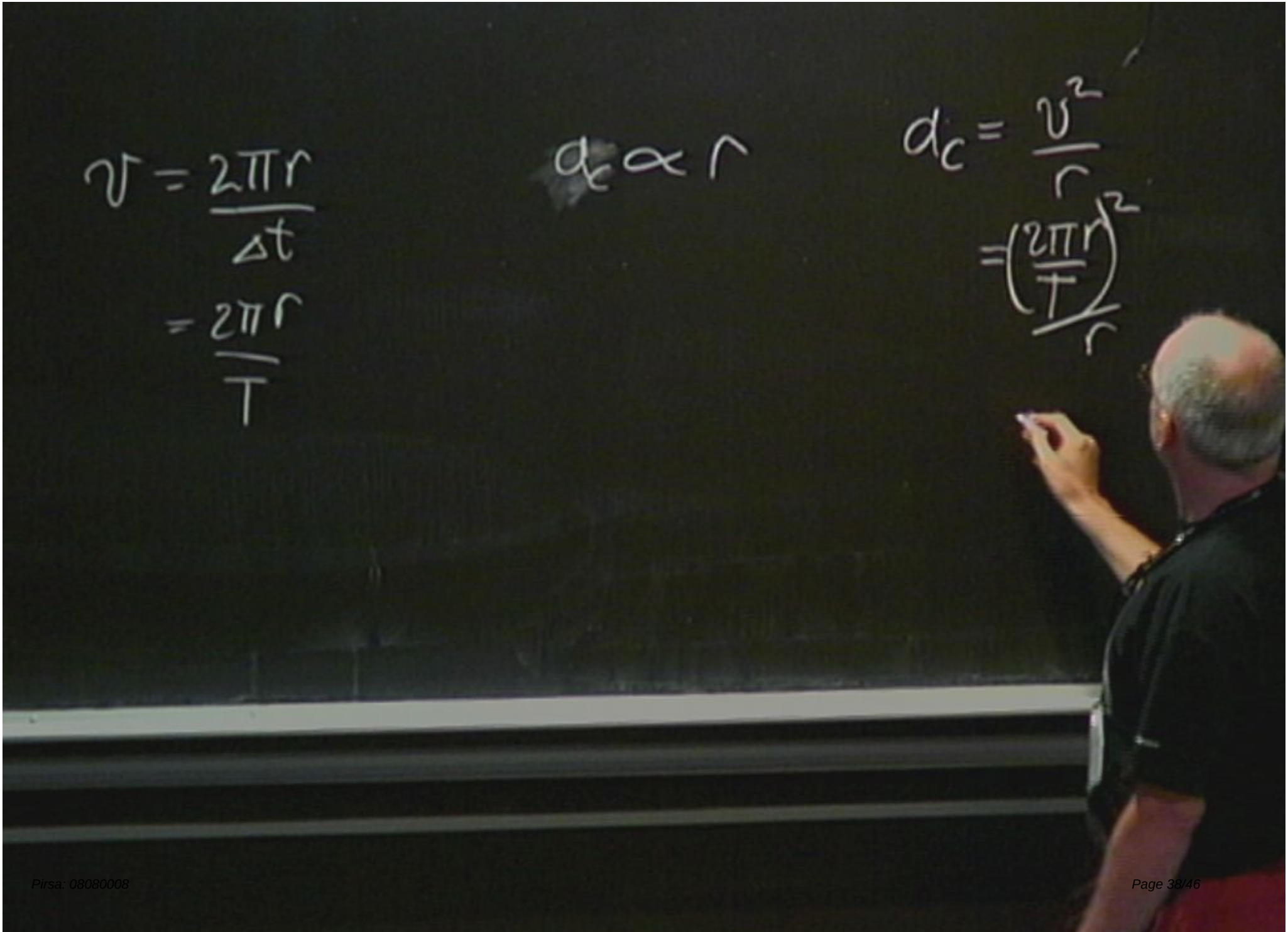
$$a_c = \frac{v^2}{r}$$



$\frac{\Delta v}{v} =$

$\Delta v =$


$v = \frac{2\pi r}{\Delta t}$
$= \frac{2\pi r}{T}$
$a_c \propto r$


$v = \frac{2\pi r}{\Delta t}$
$= \frac{2\pi r}{T}$
$a_c \propto r$
$a_c = \frac{v^2}{r}$
$= \frac{\left(\frac{2\pi r}{T}\right)^2}{r}$

$$v = \frac{2\pi r}{\Delta t}$$

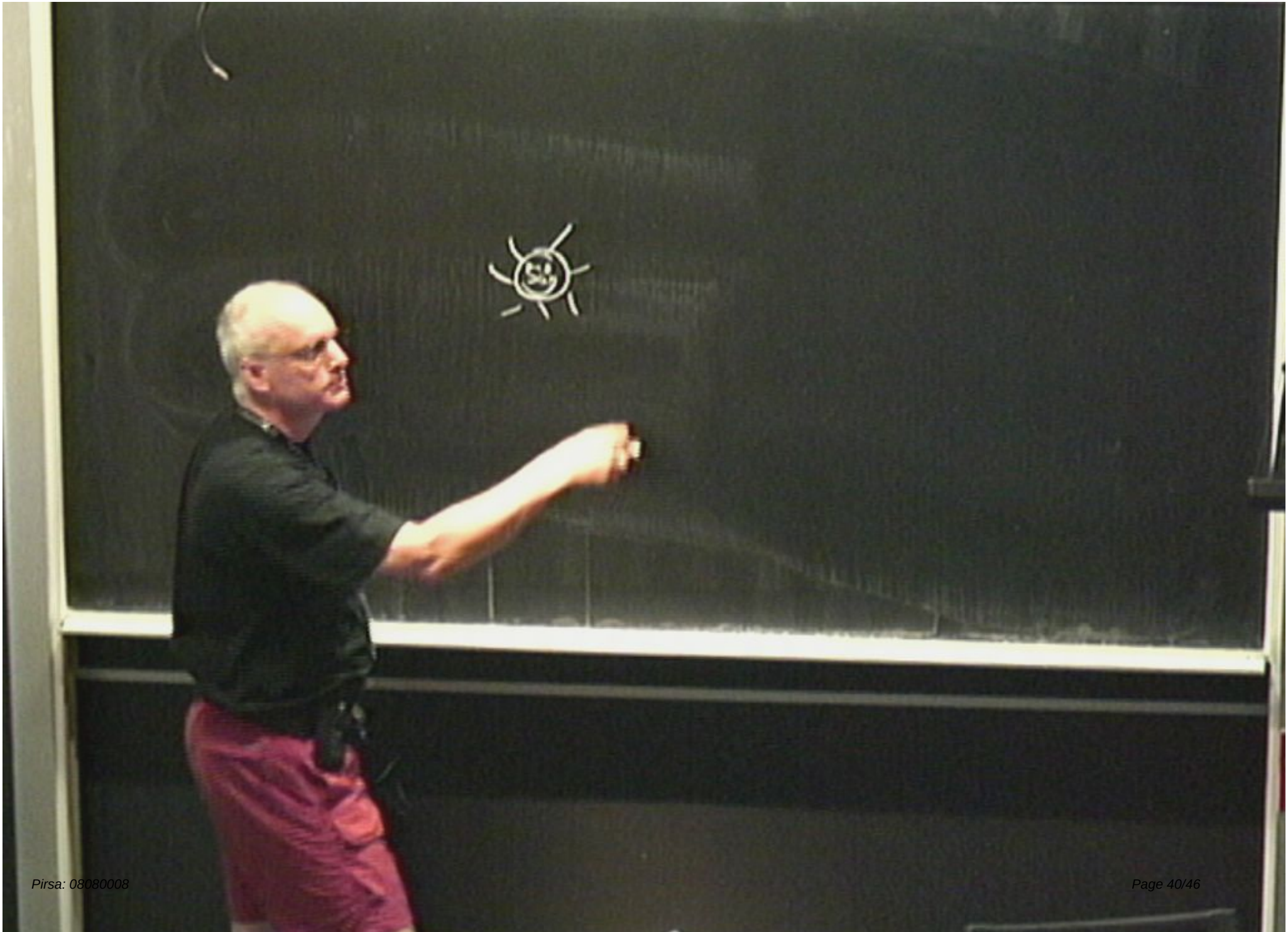
$$= \frac{2\pi r}{T}$$

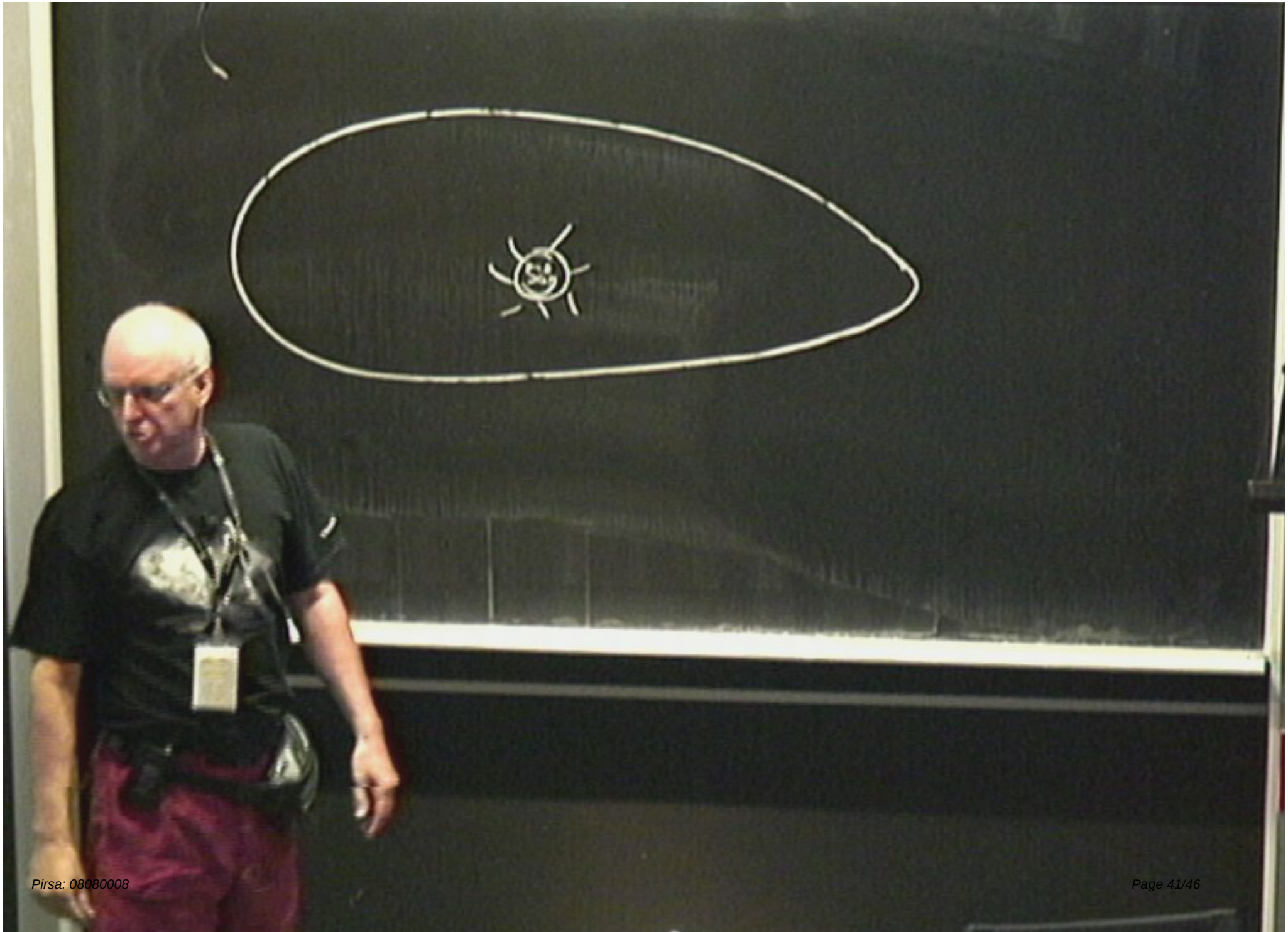
$$a_c \propto r$$

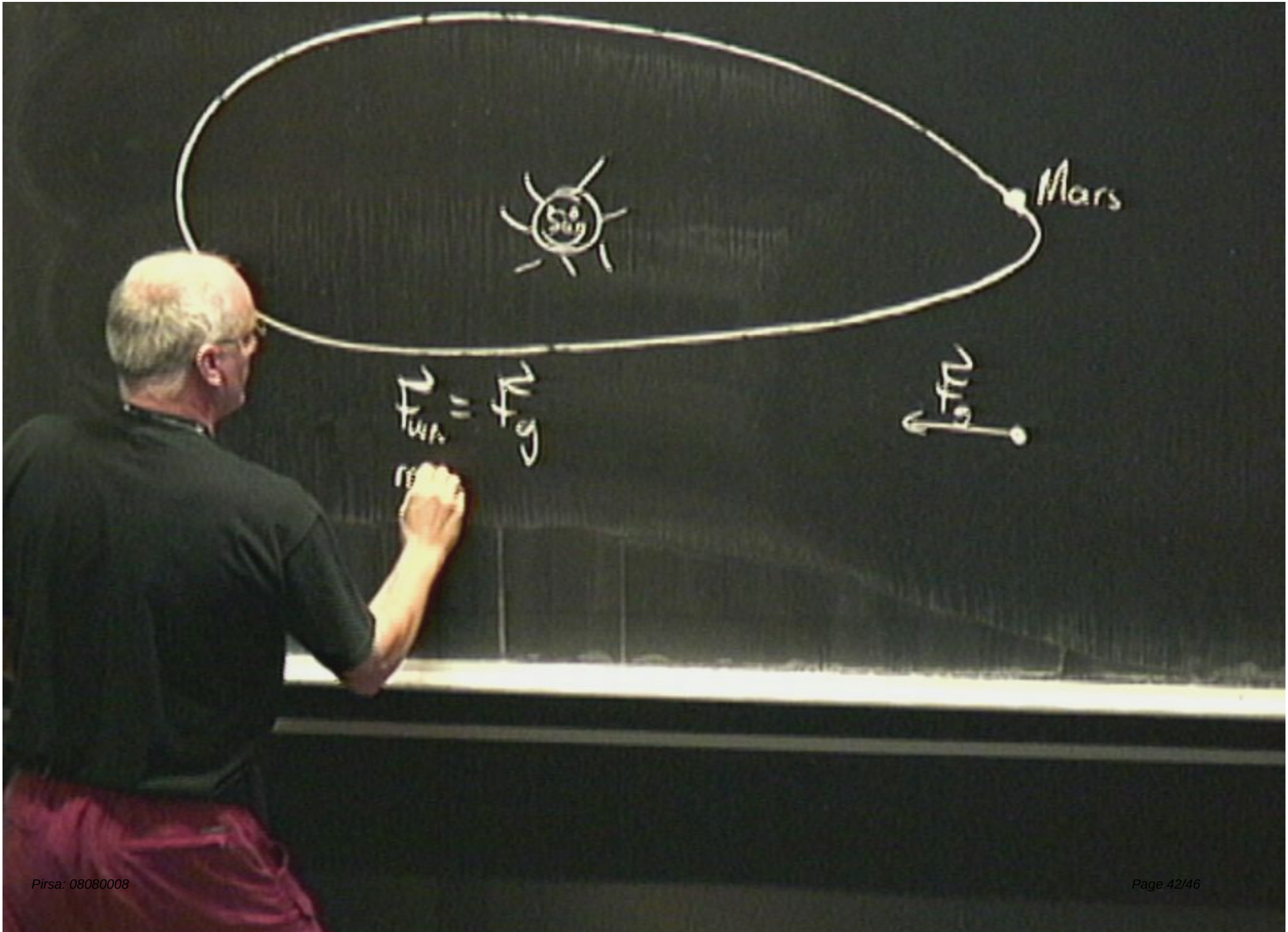
$$a_c = \frac{v^2}{r}$$

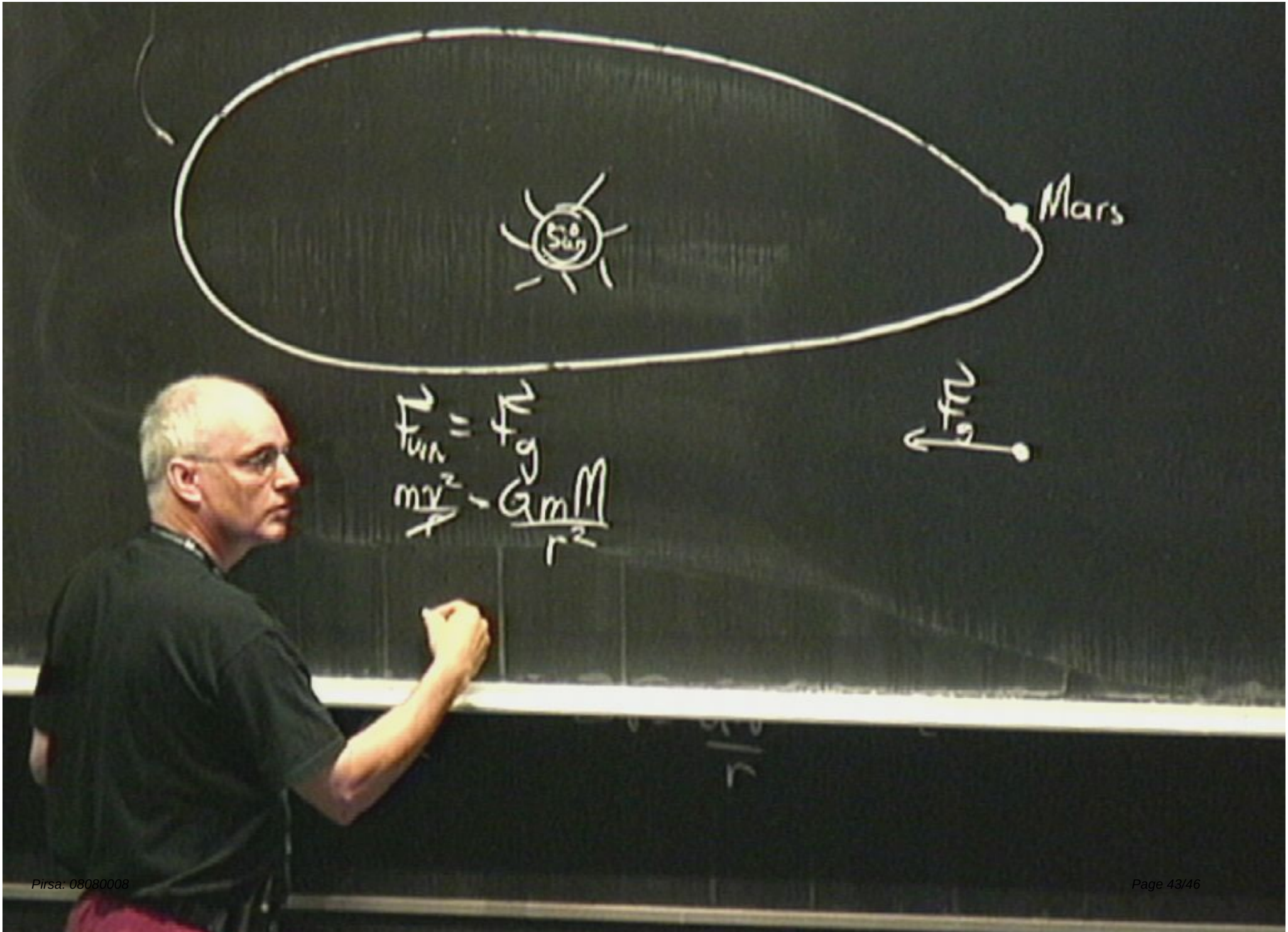
$$= \left(\frac{2\pi r}{T}\right)^2 \frac{1}{r}$$

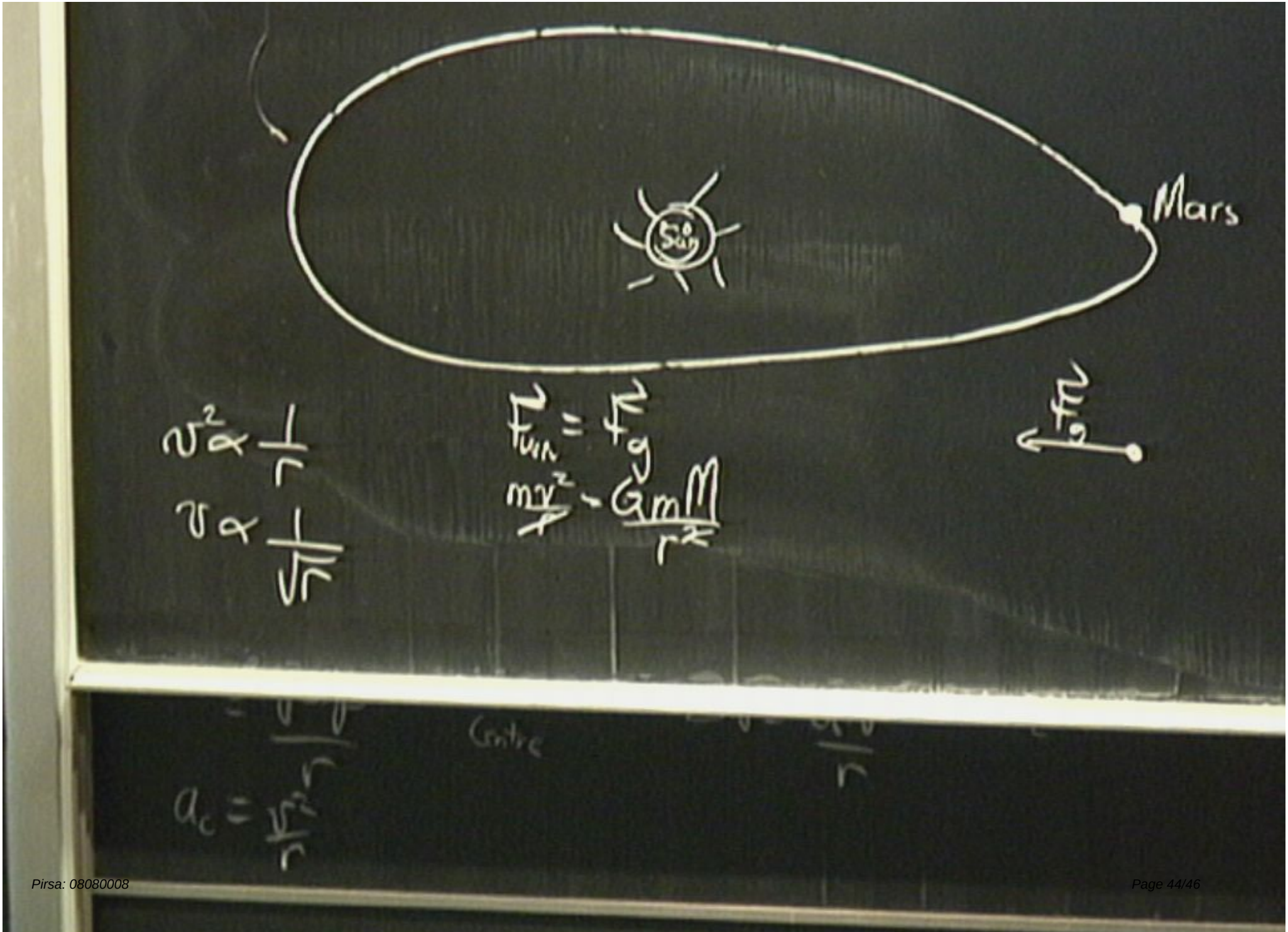
$$a_c = \frac{4\pi^2 r}{T^2}$$

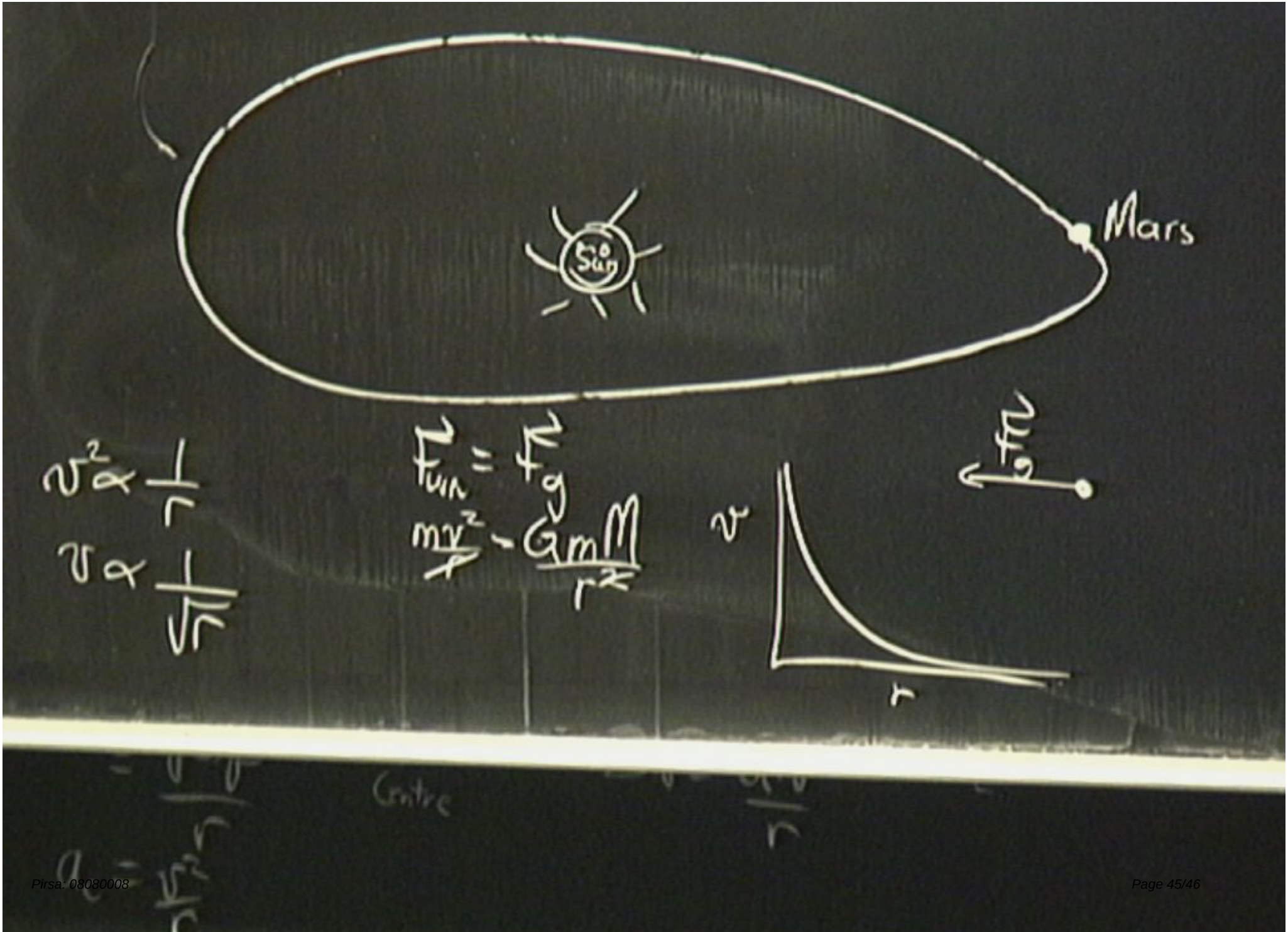





Mars
$\vec{F}_{net} = \vec{F}_g$
$\vec{F}_g$


Mars
Sun
$F_{sun} = F_g$
$m\frac{v^2}{r} = \frac{GmM}{r^2}$
$\frac{1}{r}$


Mars
Sun
$v^2 \propto \frac{1}{r}$
$v \propto \frac{1}{\sqrt{r}}$
$F_{sun} = F_g$
$\frac{mv^2}{r} = \frac{GmM}{r^2}$
F_g
F_g
Centre
$a_c = \frac{v^2}{r}$


Mars
Sun
$v^2 \propto \frac{1}{r}$
$v \propto \frac{1}{\sqrt{r}}$
$F_{sun} = F_g$
$\frac{mv^2}{r} = \frac{GmM}{r^2}$
v
r
$\frac{1}{\sqrt{r}}$
Centre