

Schutz

~~4.4~~ Schutz) Show that the # density of \vec{U}_{obs} is

$$-\vec{N} \cdot \vec{U}_{obs}.$$

$$-\vec{N} \cdot \vec{U}_{obs} = -n \vec{U} \cdot \vec{U}_{obs}.$$

$\vec{U} \cdot \vec{U}_{obs}$ is invariant, so we apply a change of frame to both so \vec{U} is in MCRF.

Then $\vec{U} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$,

$$\vec{U}_{obs} = \gamma \begin{pmatrix} 1 - \beta \\ \beta \\ 1 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \gamma \begin{pmatrix} 1 - \beta \\ \beta \\ 1 \end{pmatrix}$$

$$\vec{U} \cdot \vec{U}_{obs} = -\gamma.$$

$$\Rightarrow -\vec{N} \cdot \vec{U}_{obs} = (-n)(-\gamma) = \frac{1}{\sqrt{1-\beta^2}} n.$$