

$$\begin{array}{ccc}
\mathbb{R}^n \ni (\phi, y) & \xrightarrow{F} & \mathbb{R}^n \ni t \\
\downarrow \rho & & \downarrow g^{p_0} \\
\mathbb{T}^k \times \mathbb{R}^{n-k} & \xrightarrow{\tilde{F}} & \mathcal{M}_c
\end{array}$$