Definition (Berg)

Let **Berg** be the category defined as follows:

- \triangleright *Objects*: Objects are tuples $\langle p, v \rangle$, where
 - $p \in L$,
 - $v \in \mathbb{R}^3$ (we think of this as a tangent vector to L at p).
- \triangleright Morphisms: A morphism $\langle p_1, v_1 \rangle \rightarrow \langle p_2, v_2 \rangle$ is $\langle \gamma, T \rangle$, where
 - $T \in \mathbb{R}_{\geq 0}$,
 - γ : $[0,T] \to L$ is a C^1 function with $\gamma(0) = p_1$ and $\gamma(T) = p_2$, as well as $\dot{\gamma}(0) = v_1$ and $\dot{\gamma}(T) = v_2$ (we take one-sided derivatives at the boundaries).
- ▶ *Identity morphism:* For any object $\langle p, v \rangle$, we define its identity morphism $\mathrm{Id}_{\langle p, v \rangle} = \langle \gamma, 0 \rangle$ formally: its path γ is defined on the closed interval [0, 0], (with T = 0 and $\gamma(0) = p$). We declare this path to be C^1 by convention, and declare its derivative at 0 to be v.
- *→ Composition of morphisms:* Given morphisms

$$\langle \gamma_1, T_1 \rangle : \langle p_1, v_1 \rangle \rightarrow \langle p_2, v_2 \rangle$$

and

$$\langle \gamma_2, T_2 \rangle : \langle p_2, v_2 \rangle \rightarrow \langle p_3, v_3 \rangle$$

their composition is $\langle \gamma, T \rangle$ with $T = T_1 + T_2$ and

$$\gamma(t) = \begin{cases} \gamma_1(t) & 0 \le t \le T_1 \\ \gamma_2(t - T_1) & T_1 \le t \le T_1 + T_2. \end{cases}$$