

$$L = \frac{1}{2} \sum_{I=1}^N M_I \dot{\mathbf{R}}_I^2 + \frac{\mu}{2} \dot{\tilde{\mathbf{n}}}^* \cdot \dot{\tilde{\mathbf{n}}} - E(\mathbf{R}, \tilde{\mathbf{n}})$$