



High-dimensional inference from the Cosmic Microwave Background on GPU

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Outline

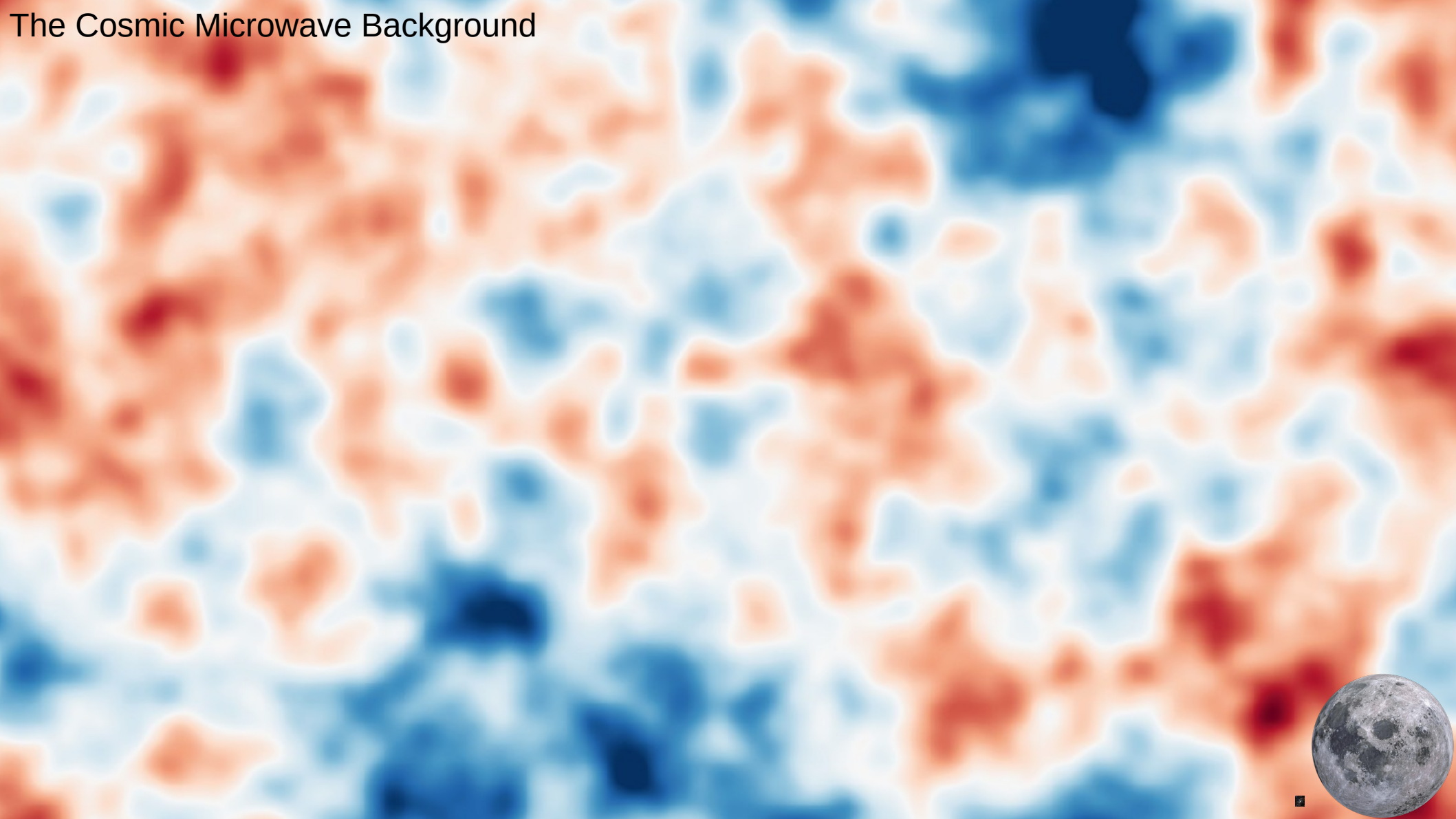
- The scientific problem we're trying to solve
- A live demo of the CMBLensing.jl package
 - With praise and constructive criticism for Julia

I work with data from the **South Pole Telescope** and **BICEP**, which are measuring the **Cosmic Microwave Background**, to try and understand **dark matter**, **dark energy**, and the properties of the **Big Bang**.

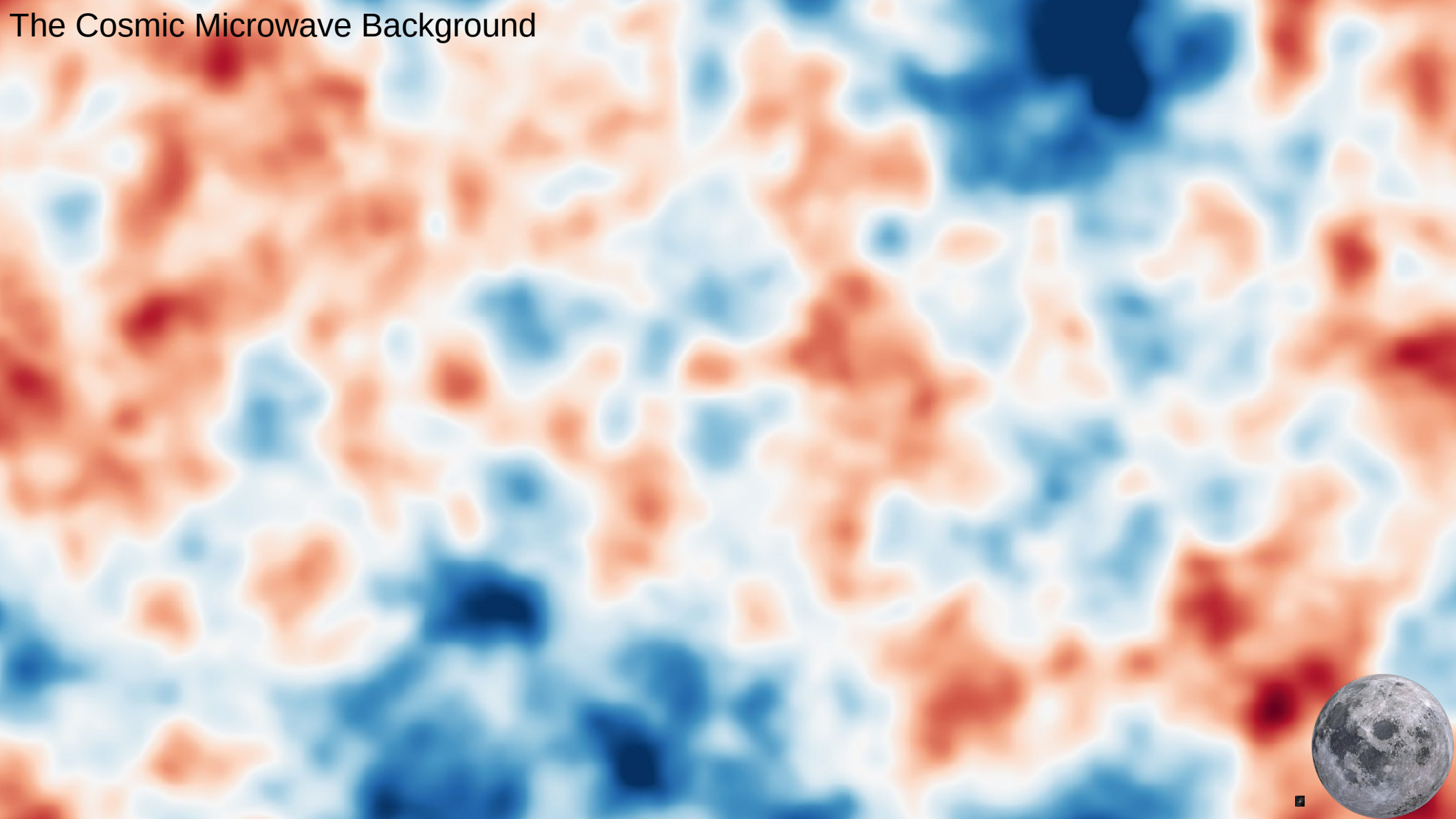


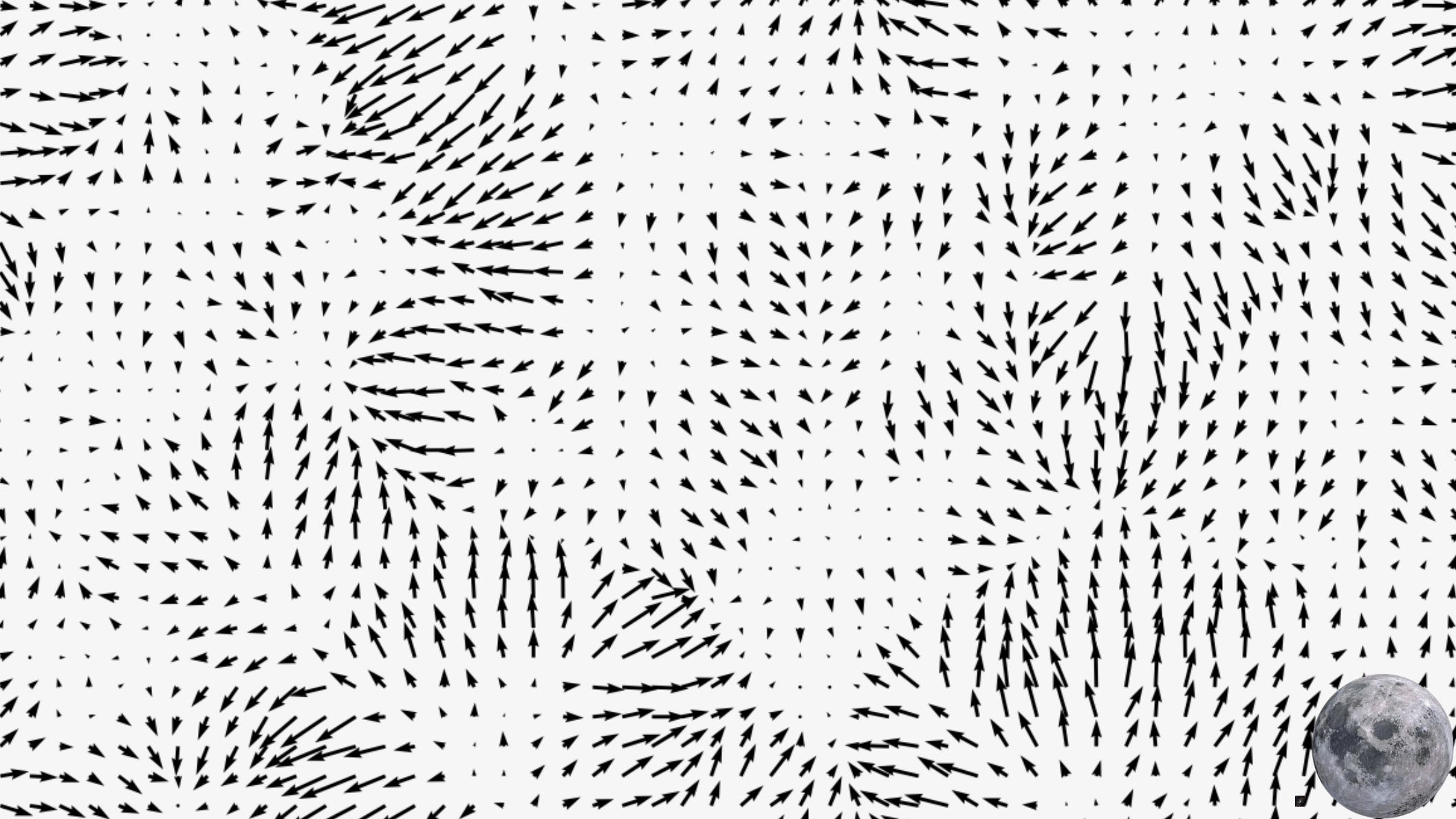


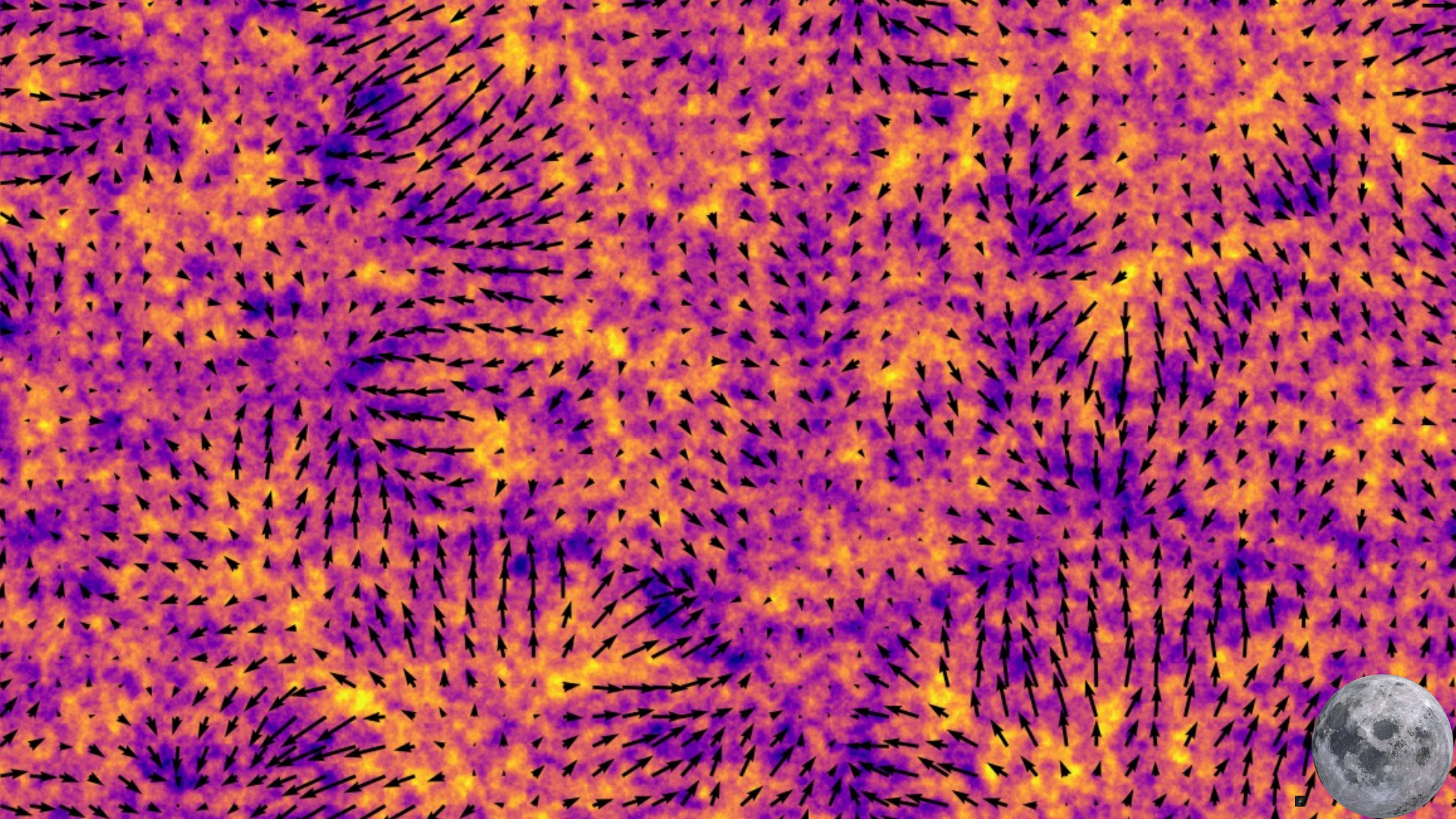
The Cosmic Microwave Background

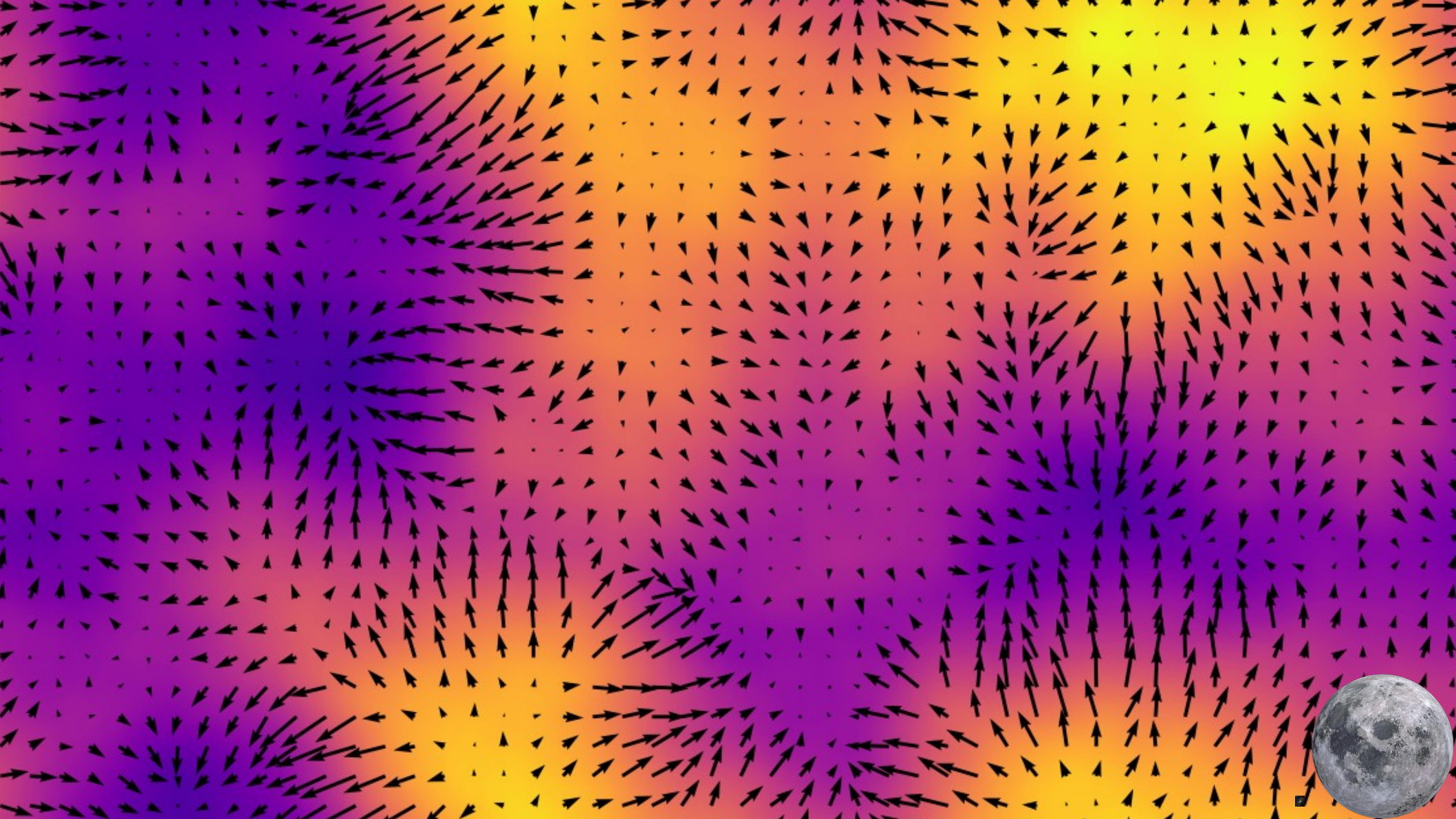


The Cosmic Microwave Background



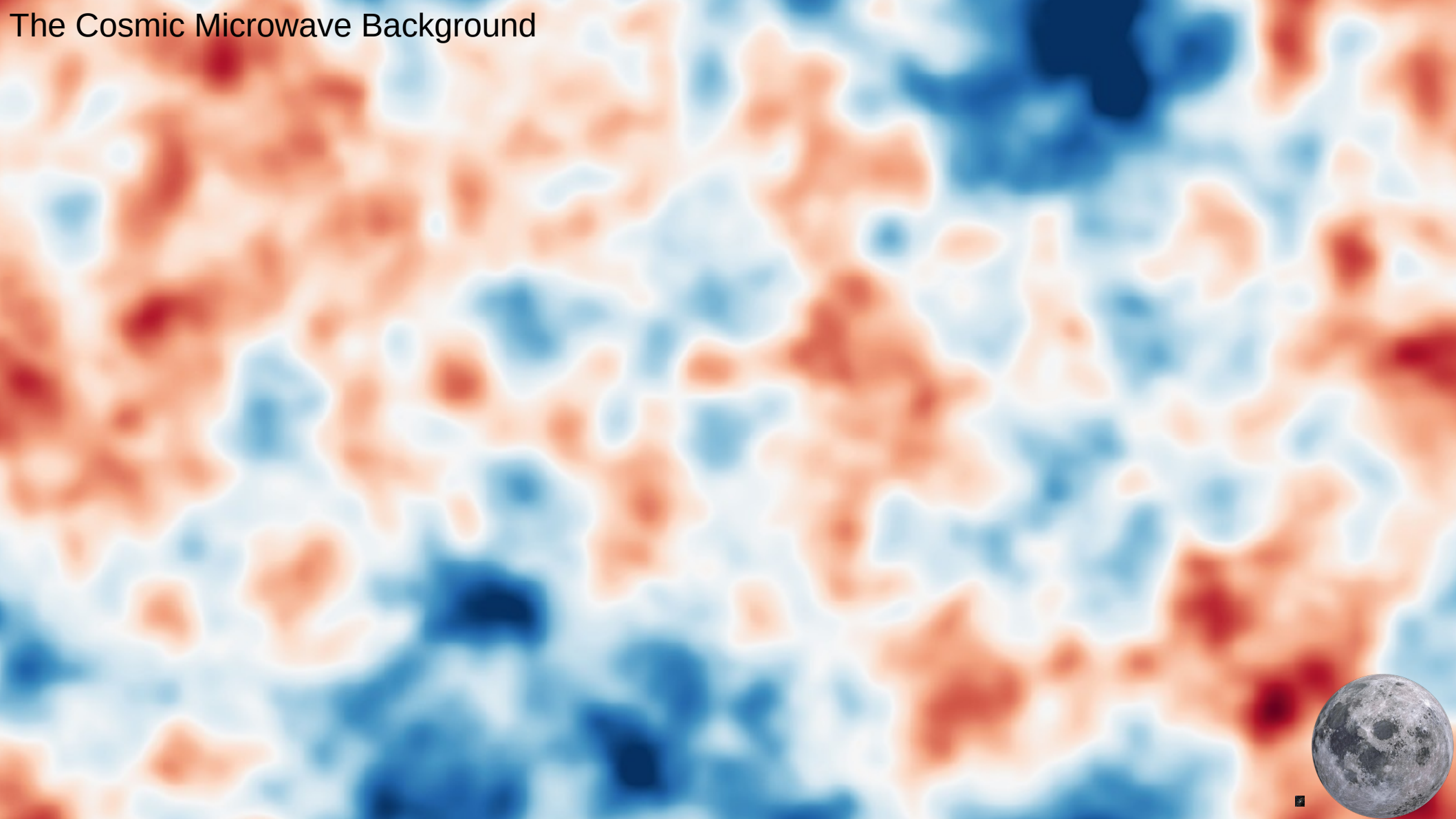




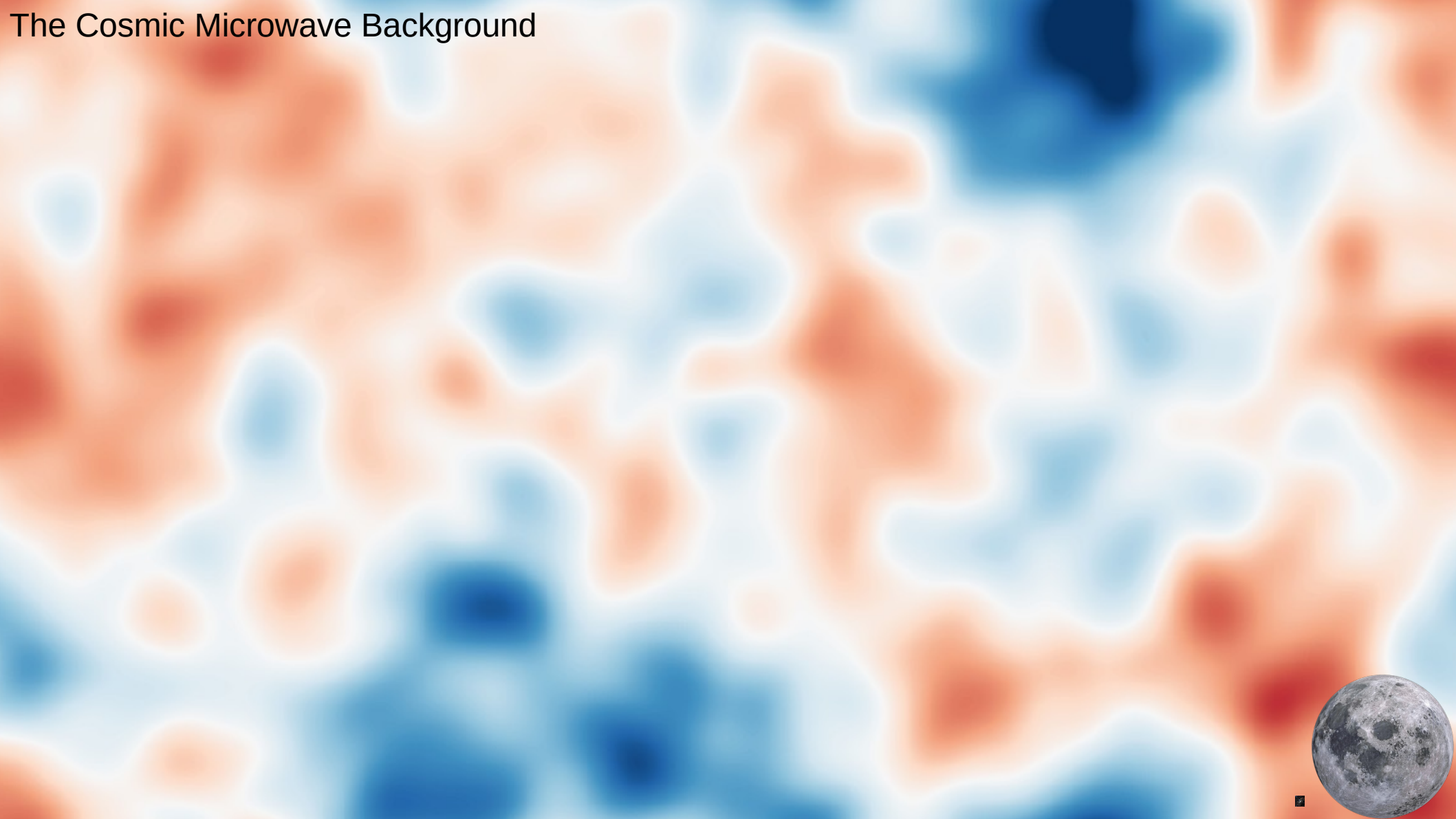




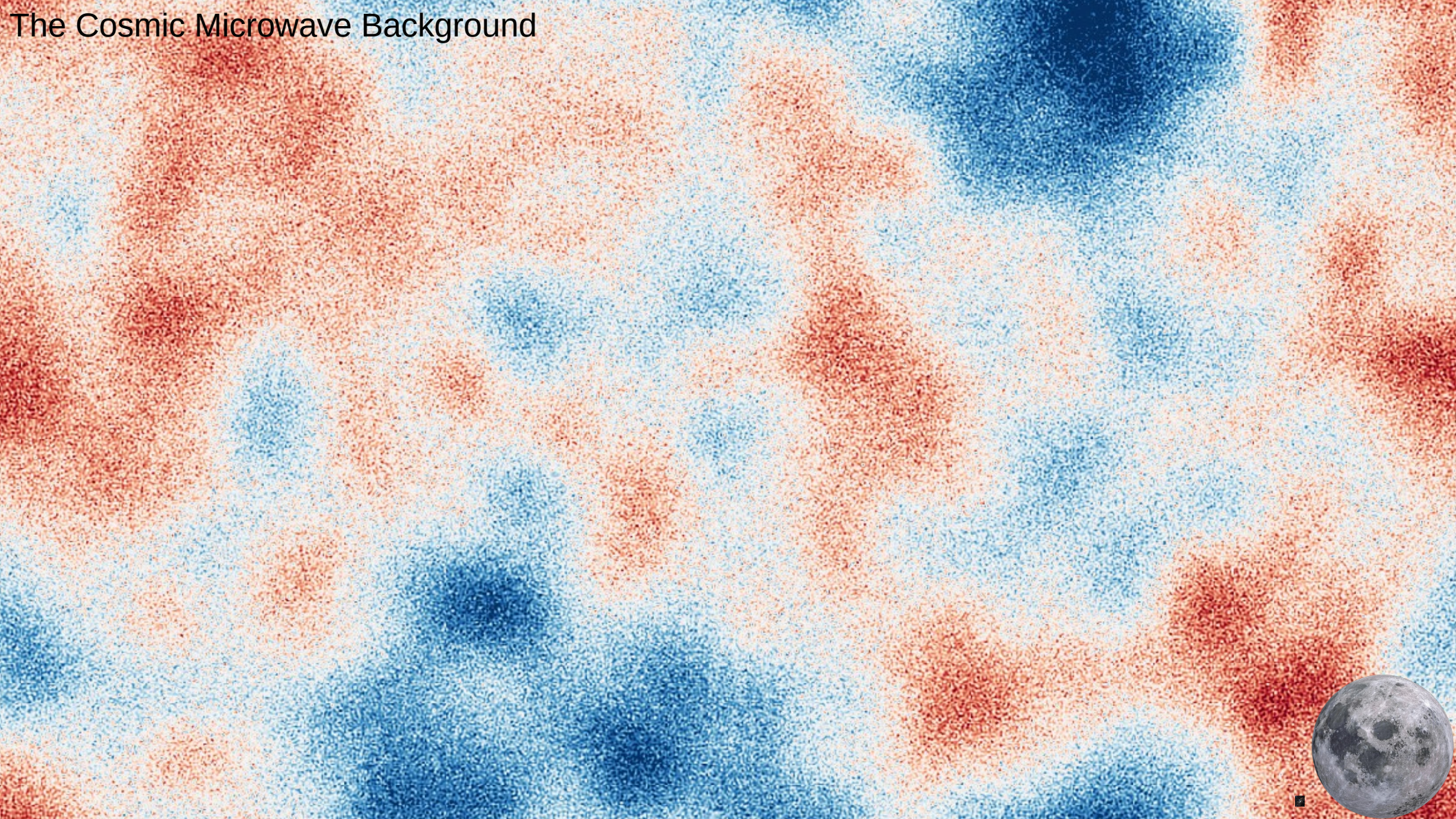
The Cosmic Microwave Background



The Cosmic Microwave Background



The Cosmic Microwave Background



- Some partial solutions exist (“quadratic estimate”) but they can be sub-optimal by $\sim 10\times$
- Our solution is based on Bayesian inference to infer constraints on the unlensed CMB, lensing potential, and parameter which control covariances.
- The Julia solution, implemented in CMBLensing.jl, makes this possible and has been demonstrated on real data.

