Rosseland Centre for Solar Physics

# Effects of spatial resolution on Stokes profiles

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#### Introduction

- Resolution fundamentally limits how small-scale processes can be included in simulations
- For observations, these sub-resolution processes still happen and can leave their mark on the recovered Stokes profiles
- So what do you "lose" by not capturing sub-resolution effects in you simulations?

# Methodology

- We ran the same Bifrost-simulation at three different spatial resolutions (6 km, 12 km, 23 km)
- Synthesized full Stokes profiles for 617.3 nm Fe I and 854.2 nm Ca II lines.
- Spatially degraded and downsampled the profiles.
- Used the center-of-gravity and weak-field-approximation to infer line-of-sight velocities and magnetic field

## Inferred quantities for Fe I 617.3 nm



R C S

#### Inferred quantities for the core of Ca II 854.2 nm







- Differences remain, even after spatial degradation
- These are mostly small-scale fine-structures.
- With increasing resolution comes more concentrated "hotspot" of more extreme field and velocity values.
- The extremes become quite a bit more extreme.
- Same tendency displayed in both photosphere and chromosphere.



### Conclusions