

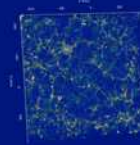
# Cosmic flow reconstruction from deepest distance surveys (and redshift surveys)

Institut d'Astrophysique de Paris (CNRS)

**Collaboration:**

- Jens Jasche (TUM/ExC),
- Michael Hudson (UoW), Benjamin D. Wandelt (UPMC/IAP),
- Hélène Courtois (Lyon 1/IPNL),
- Florent Leclercq (Portsmouth)





# Full modeling for density & velocity inference

## Distance survey point of view

- **VIRBIUS model** (Lavaux 2016)
- Fully probabilistic, integrated calibration correction
- **Application to**
  - Cosmic Flows 2.1, and then CosmicFlows 3 (Courtois, Tully et al.)
  - Supernovae samples
  - Future deep distance surveys (SDSS, Taipan, ...)
- **Future:** more detailed automatic calibration, handle larger surveys

## Spectroscopic survey point of view

- **BORG model** (Jasche & Wandelt 2013, Lavaux & Jasche 2016)
- Fully probabilistic forward modeling of LSS
- **Application to**
  - SDSS (Jasche & Wandelt 2013)
  - 2M++ (Lavaux & Jasche 2016)
  - SDSS3 (Lavaux et al., in prep; + D. Kodi Ramanah)
  - Future surveys (SDSS4, DES, DESI, Euclid, WFIRST, ...)
- **Future:** joint analysis with distance surveys, observables, local initial conditions cosmology

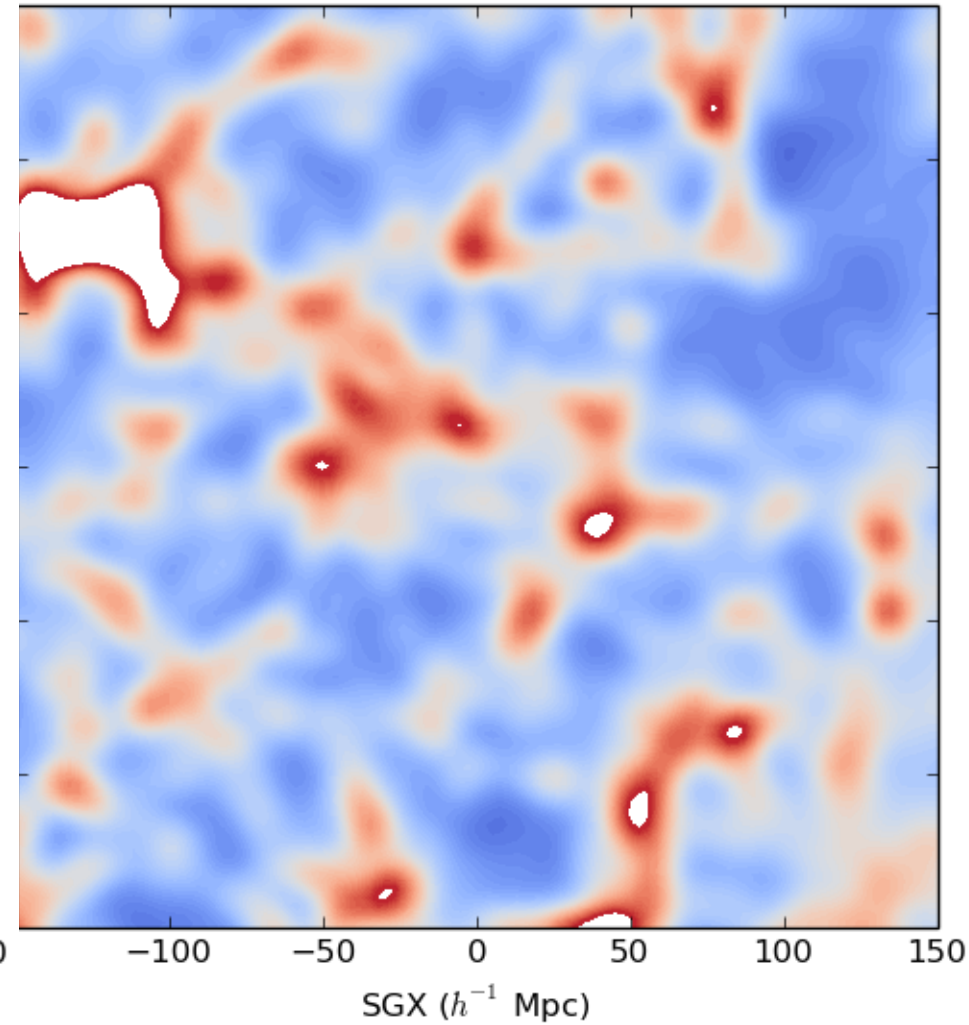
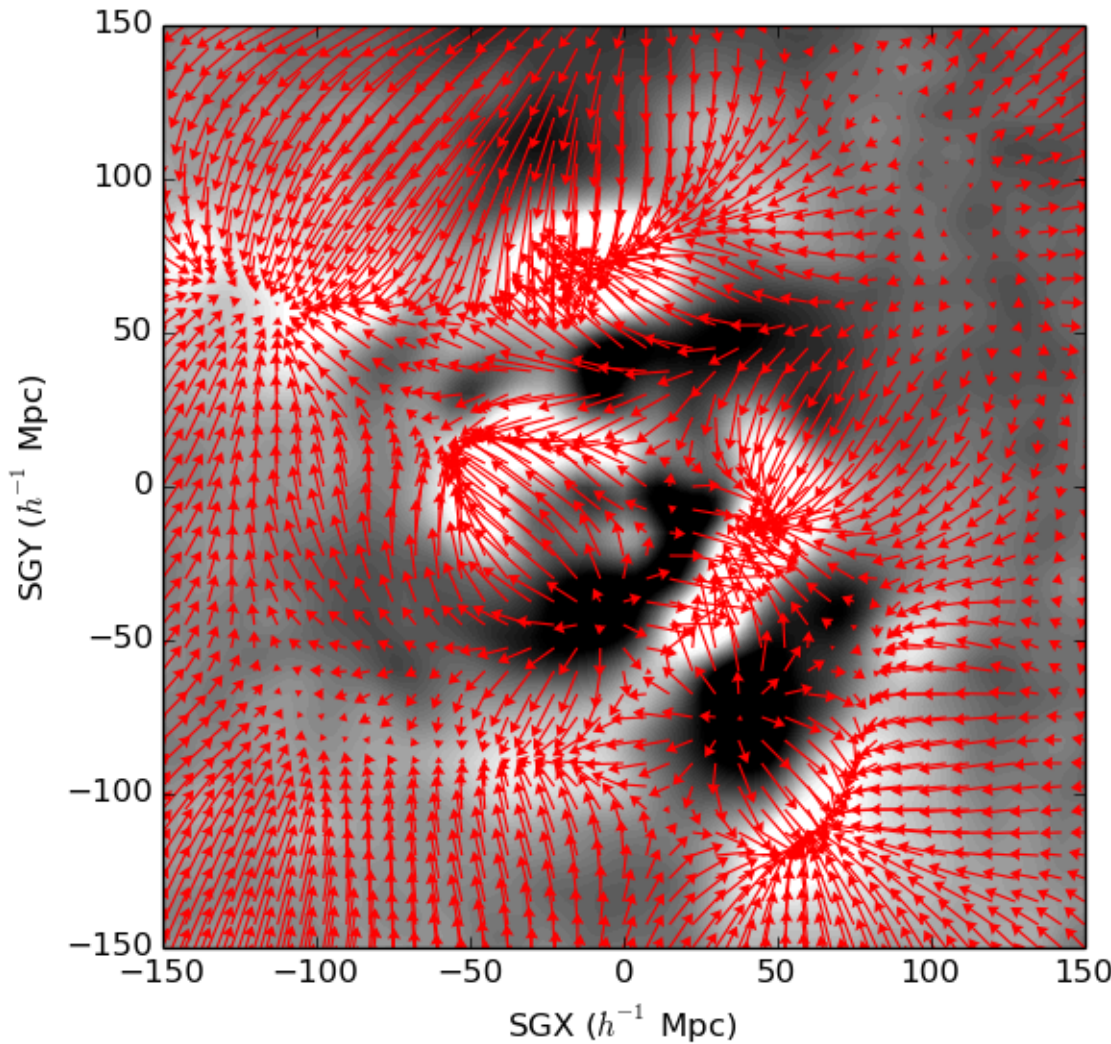
# VELMASS: density & velocity in the Local Universe



PRELIMINARY

VIRBIUS model

BORG-LPT model



CF2.1, mean divergence field + velocity

2M++, mean final matter density field,  
smoothed 5 Mpc/h

Supergalactic plane

# Meta-characteristics found by VIRBIUS

