
# Low dispersion meteor velocity measurements with CABERNET

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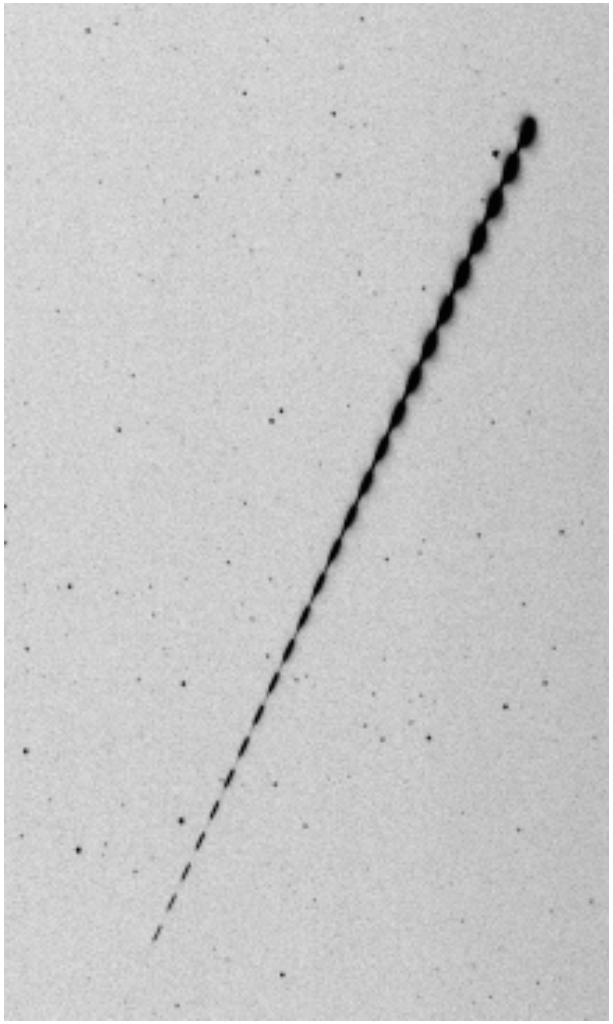
# About CABERNET



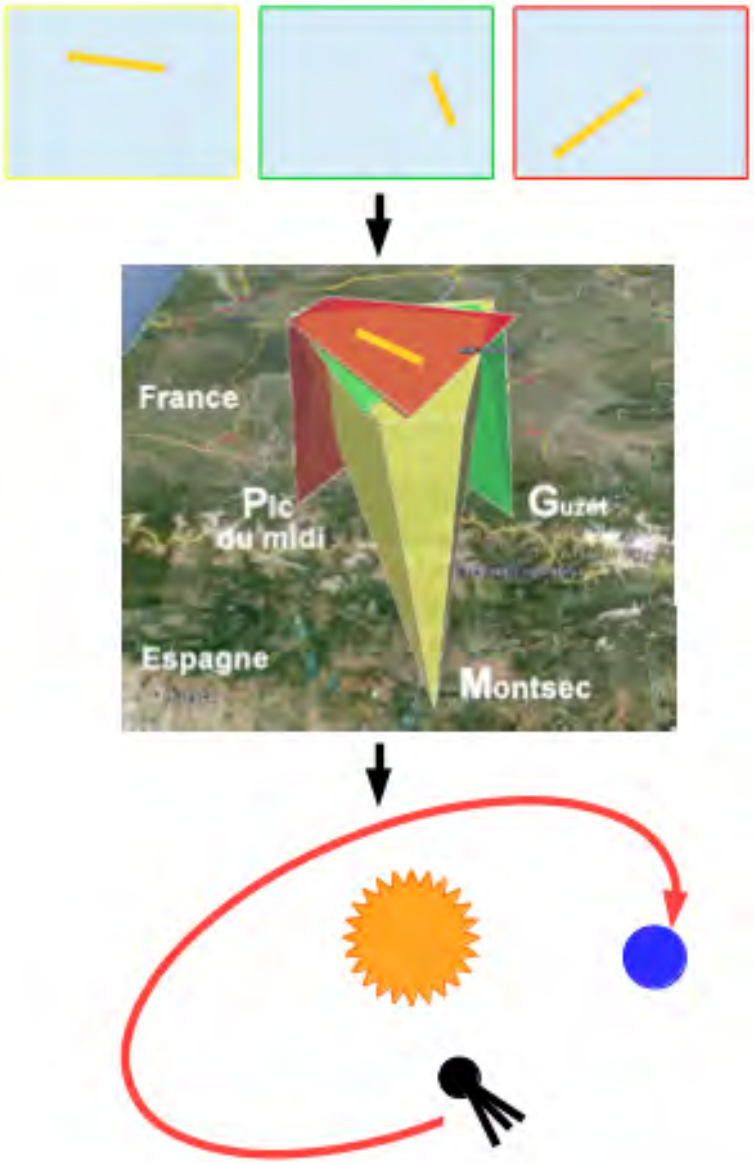
Meteor detected by a CABERNET camera

**CABERNET :** find parent bodies of meteors showers

$\rightarrow$ accurate 3D trajectory and velocity

- **Meteor position in the image**
- **Information about velocity**
  $\rightarrow$ electronic shutter

# About CABERNET

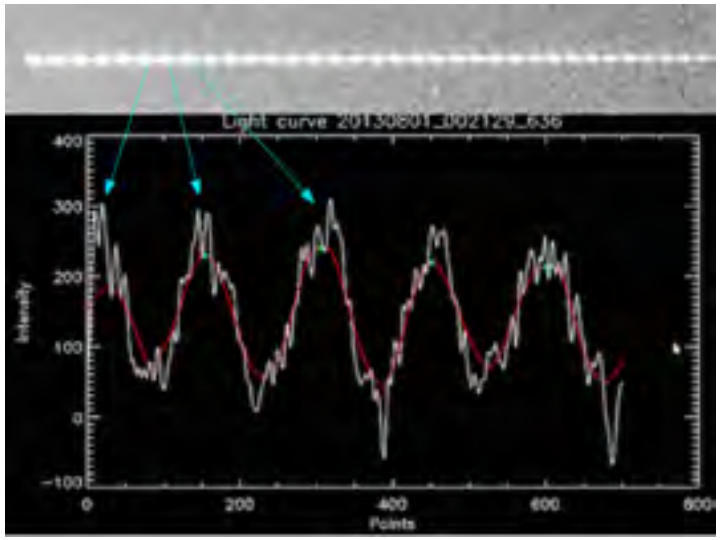


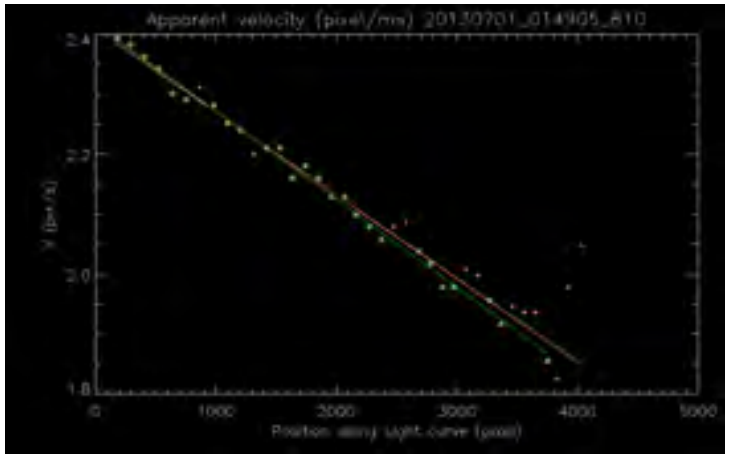

**CABERNET :** find parent bodies of meteors showers

→ accurate 3D trajectory and velocity

- **Meteor position in the image**
- **Information about velocity**
  → electronic shutter
- **Astrometric reduction**
  → Sextractor, PSFEX, SCAMP
- **3-D trajectory and orbit**
  → Ceplecha 1987, Atreya 2012

# Computation of velocity




**RANSAC** : modelling improved by a factor 2

Centroids detection

↓

Apparent velocity modelling

↓

Interpolation of the positions of centroids 1 ms later

↓

3D coordinates of centroids $(t)$, centroids $(t + 1ms)$ (Ceplecha, 1987)

↓

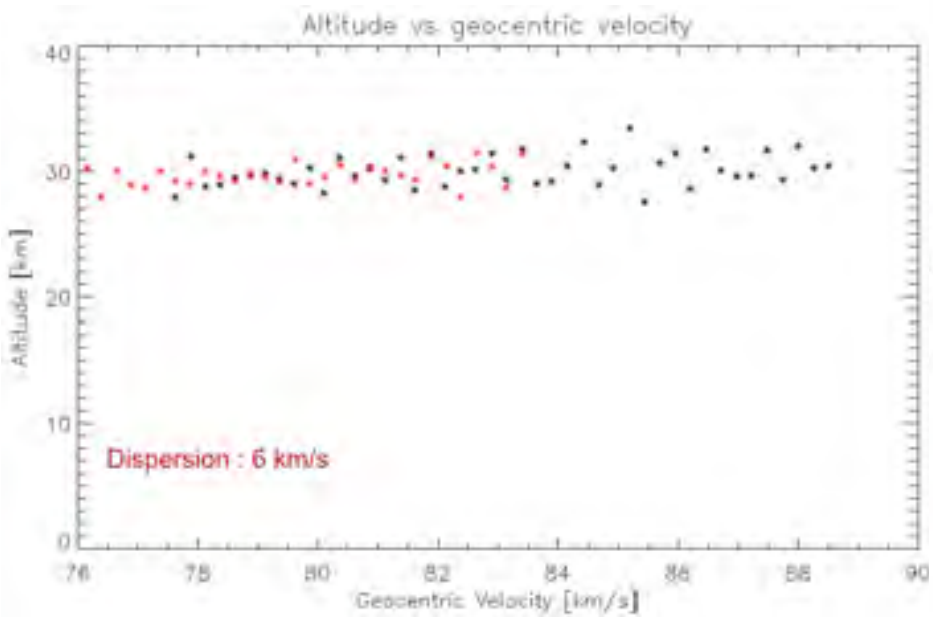
$$V_{3D} = {P^{geoc}}_t - {P^{geoc}}_{t+1ms}$$
$$(\mathrm{km.ms^{-1}})$$

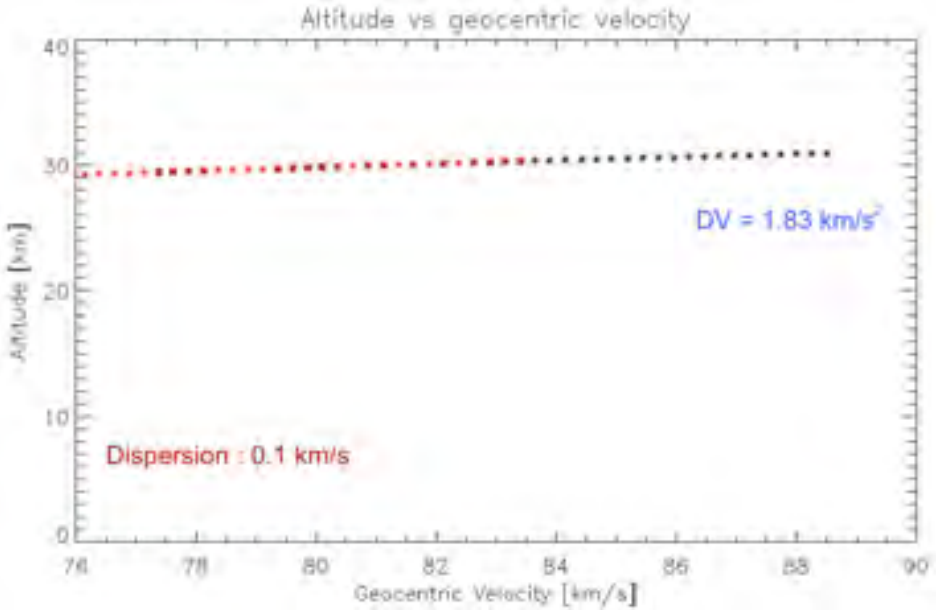
# Comparison between 2 methods

$$V = \frac{\text{centroid}_{i+1} - \text{centroid}_i}{t(\text{centroid}_{i+1}) - t(\text{centroid}_i)} \quad (\text{km.s}^{-1})$$

$$V_{apparent} = \frac{P_{t+\Delta t} - P_t}{\Delta t} \ , \Delta t = 1 \ ms$$

$$V_{3D} = {P^{geoc}}_t - {P^{geoc}}_{t+1ms} \ (\text{km.ms}^{-1})$$

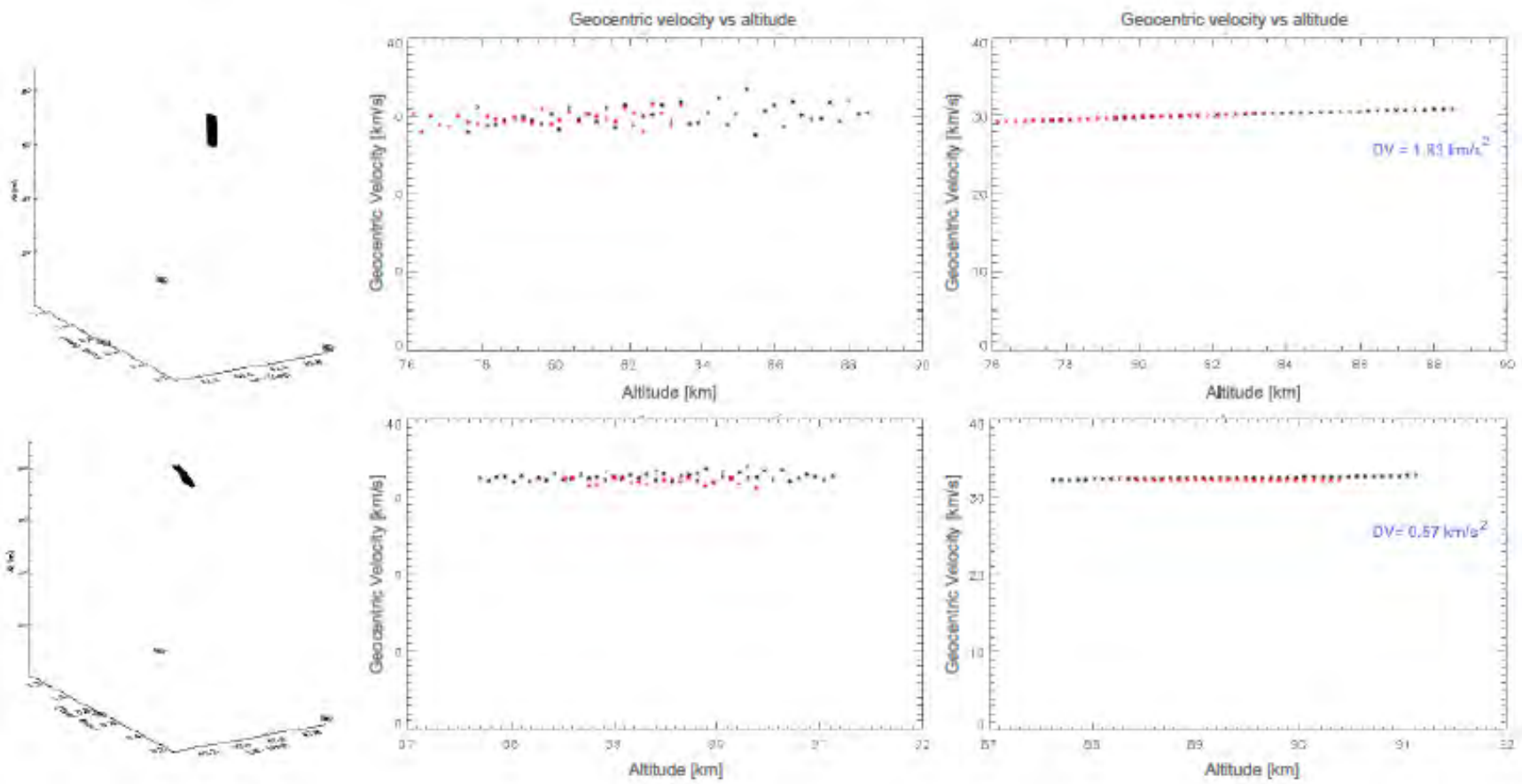



→ Lower dispersion of the fitted data

→ **10-100 times better accuracy of velocity determination**

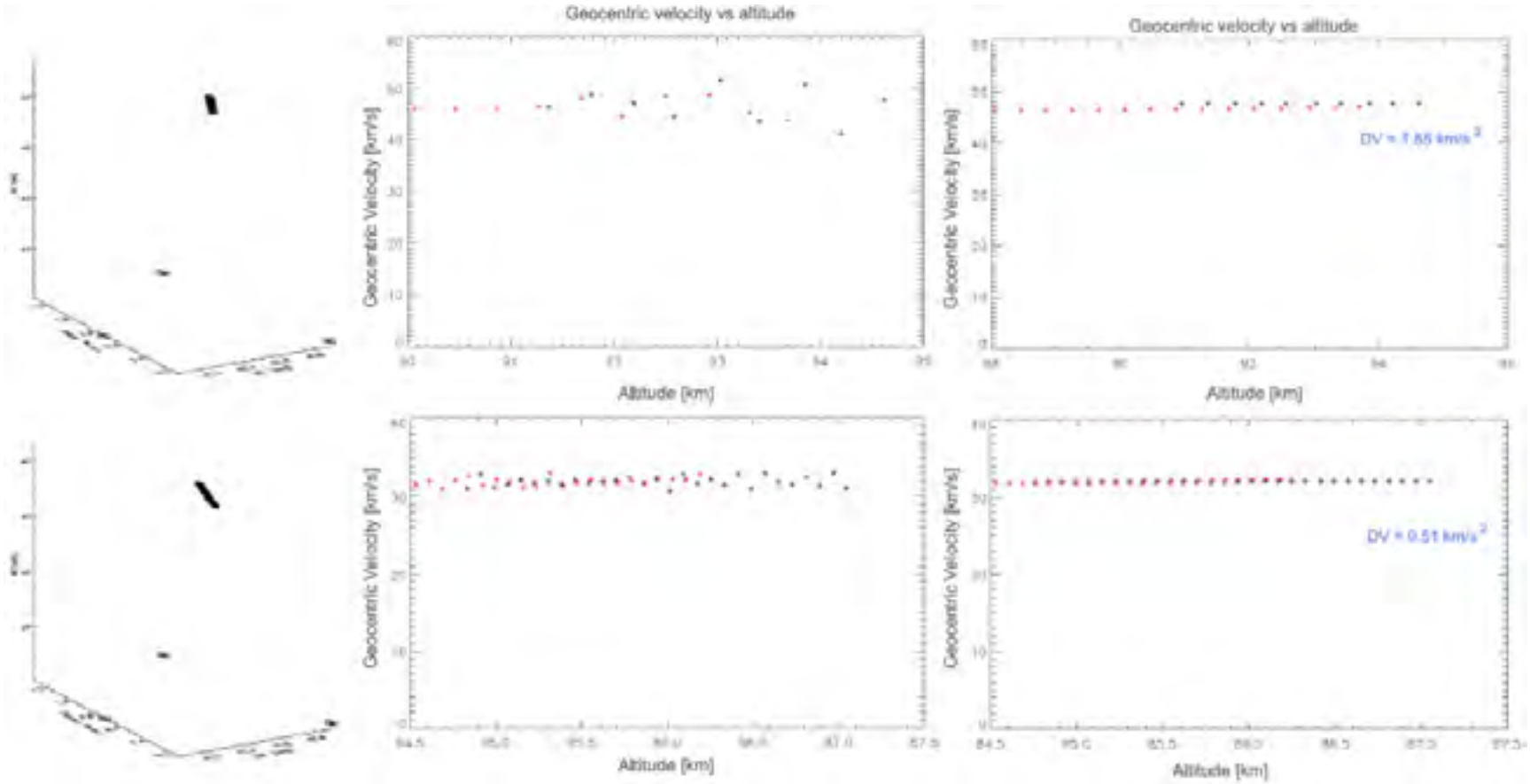
# 28/11/2013 detections




→ **Coherent velocity profiles**

→ **Deceleration measurable**

# 28/11/2013 detections




→ **At least 10 times better accuracy of velocity determination**

# Conclusion

- much more robust determination of the velocity
- lower dispersion of the fitted data
- velocity changes measurables

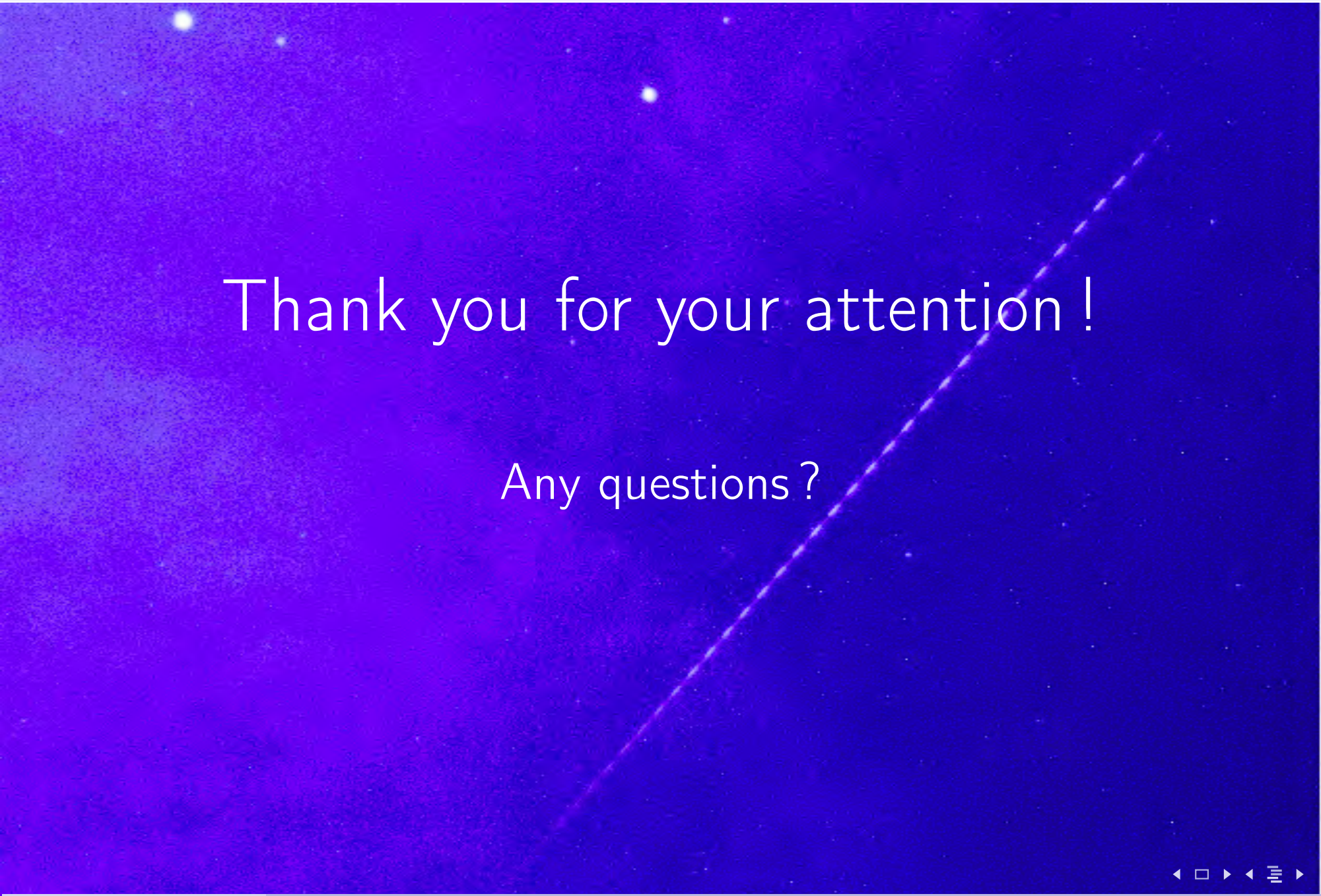
  $\rightarrow$ **10 times better accuracy of velocity determination at least**

**Future work** :

- Linearity of the apparent velocity / distorsion
- Optimization of the 3-D trajectory reconstruction

  *A new method of meteor trajectory determination applied to multiple unsynchronized video cameras*

  Gural, 2012
- Improve the astrometric accuracy
- Correct the problem of variance between cameras


Thank you for your attention !
Any questions ?

# References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