Forward modelling of coronal loop emission with FoMo-C/FoMo-IDL

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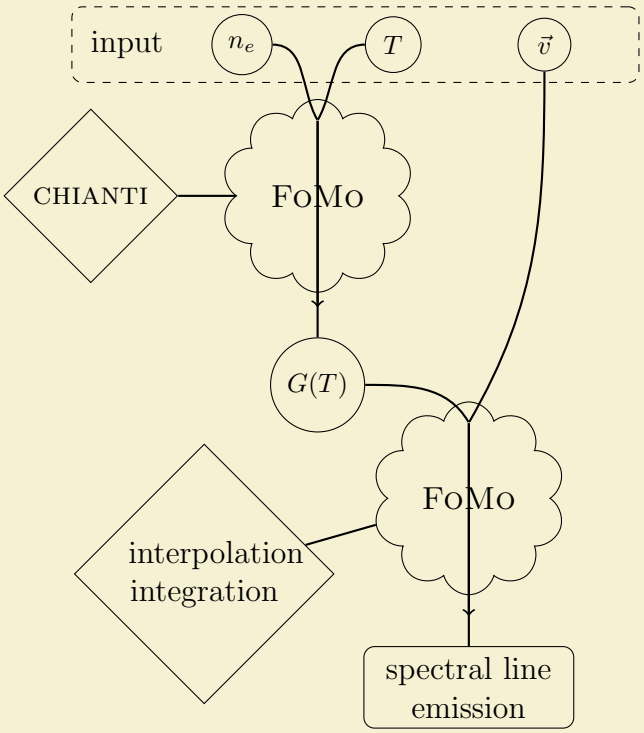
Motivation

- Corona is optically thin.
- Reconciliation of models with observations is non-trivial and open for interpretation.
- Forward modelling creates synthetic observations.
- Large project at KU Leuven to create forward modelling framework.
- Application to modelling oscillations. (but not limited to that)

Flowchart

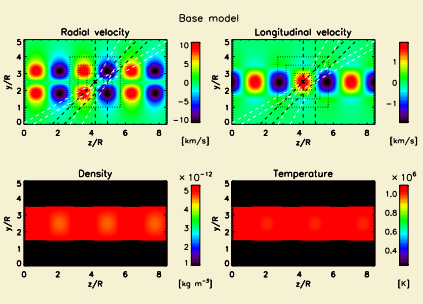


Features

	FoMo-IDL	FoMo-C
2D	✓	(✓)
3D	✓	✓
regular grid	✓	✓
irregular grid	x	✓
EUV optically thin	✓	✓
ionisation equilibrium	✓	✓
non-ionisation equilibrium	x	x
gyrosynchrotron	✓	x
parallel	splitting of data	OpenMP
computation time	better	worse

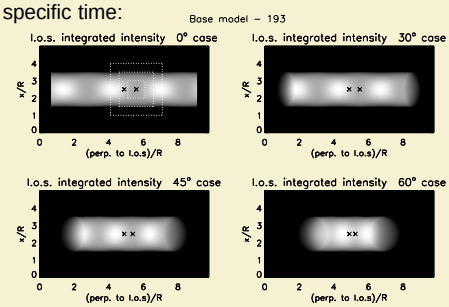
Case study: sausage modes

axisymmetrically expanding and contracting cylinder as a fast sausage mode

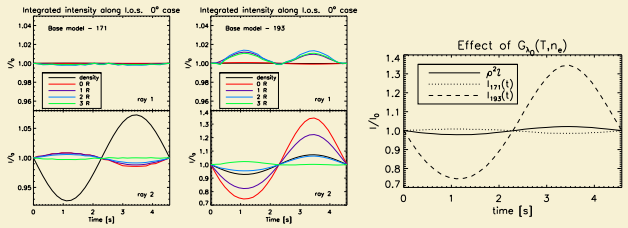


Intensity (Antolin)

Intensity at a specific time:



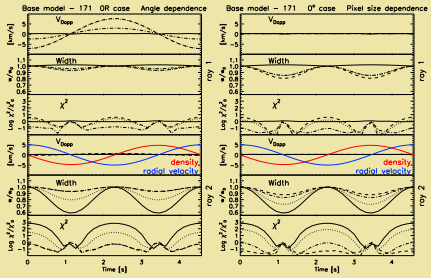
Intensity at a specific location (as a function of time):



Time variation of intensity depends on wavelength! Naive approach is bad.

Spectral information (Antolin)

Spectral parameters as function of time:

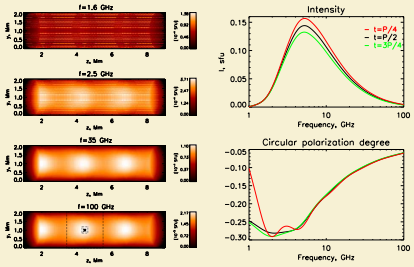


Double period in line width.

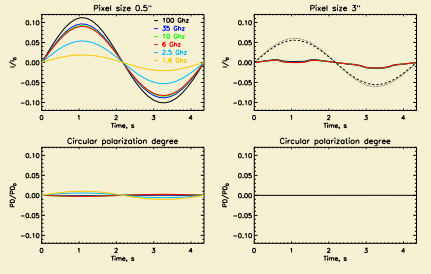
Gyrosynchrotron emission (Reznikova)

Non-thermal particles $5 \times 10^7 \mathrm{cm}^{-3}$, power law index $\delta = 3.5$.

GS emission for LOS angle $30°$. Left: $t = P/4$, right: for resolution .5"



Influence of spatial resolution:



Conclusions

- FoMo-C/FoMo-IDL framework for forward modelling of coronal emission: production ready, many features.
- Case study for sausage modes.
- Intensity variation very different from naive approach.
- Double period in line width.