

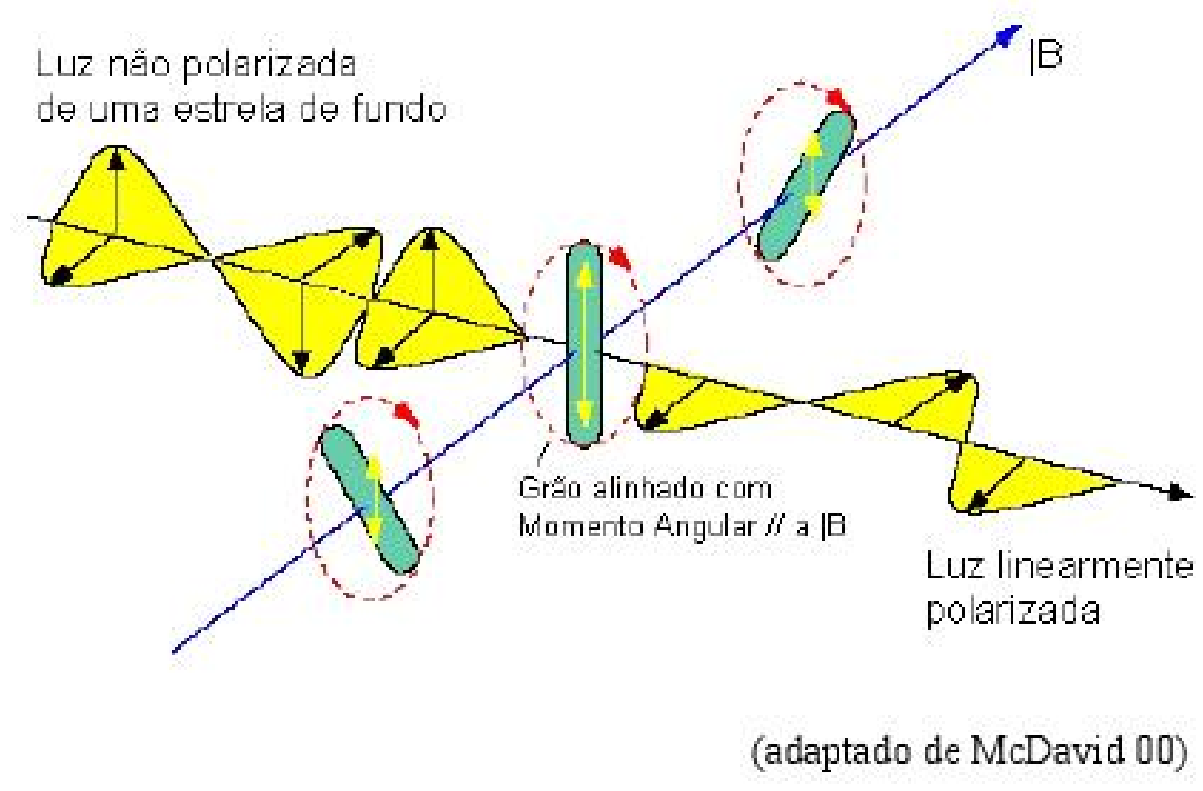


THE MAGNETIC STRUCTURE FIELD OF THE INTERSTELLAR MEDIUM

Marcelo S. Rubinho (IAG-USP), Antônio Pereyra (ON) e Antônio M. Magalhães (IAG-USP)
Instituto de Astronomia, Geofísica e Ciências Atmosféricas da Universidade de São Paulo



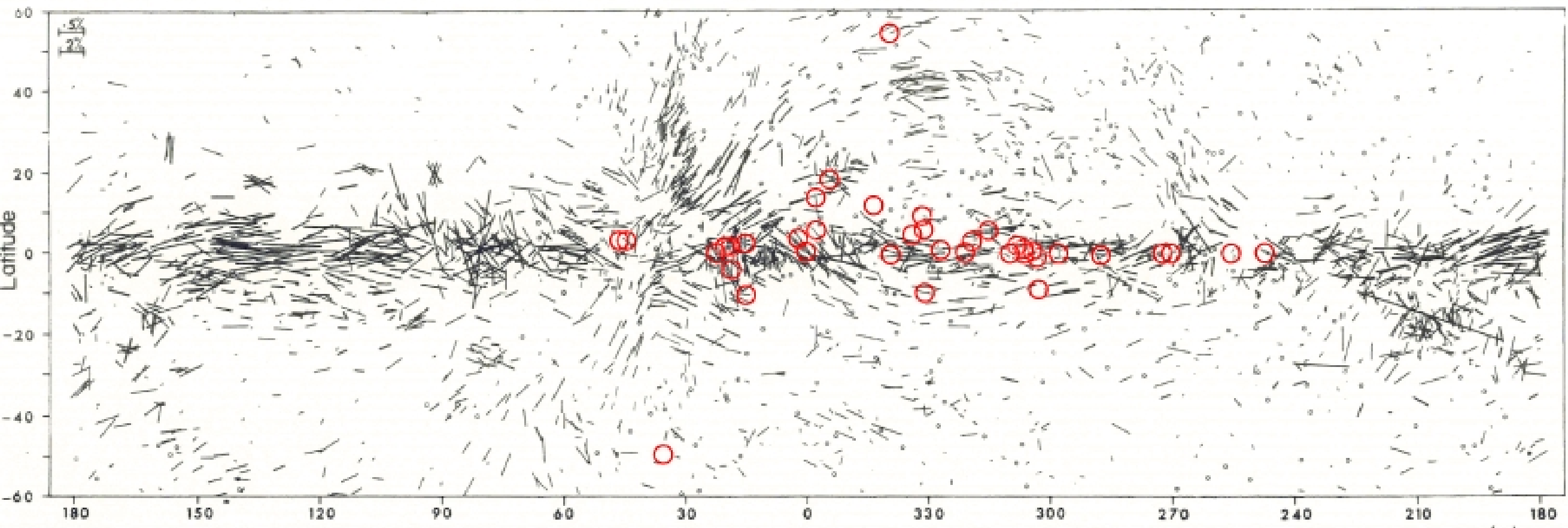
Introduction



- ▶ The dust grains are aligned with the **interstellar magnetic field**.
- ▶ Using polarization, we can then obtain informations about weight, chemistry composition and structure of magnetic fiels.

The Interstellar Medium (ISM) Fields Study

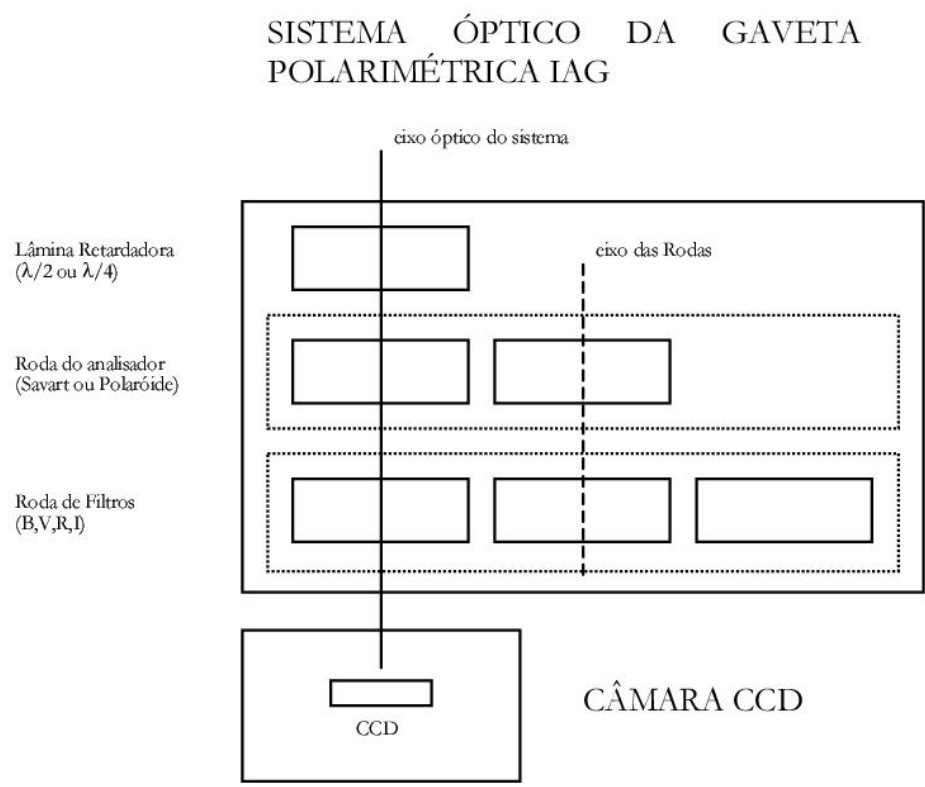
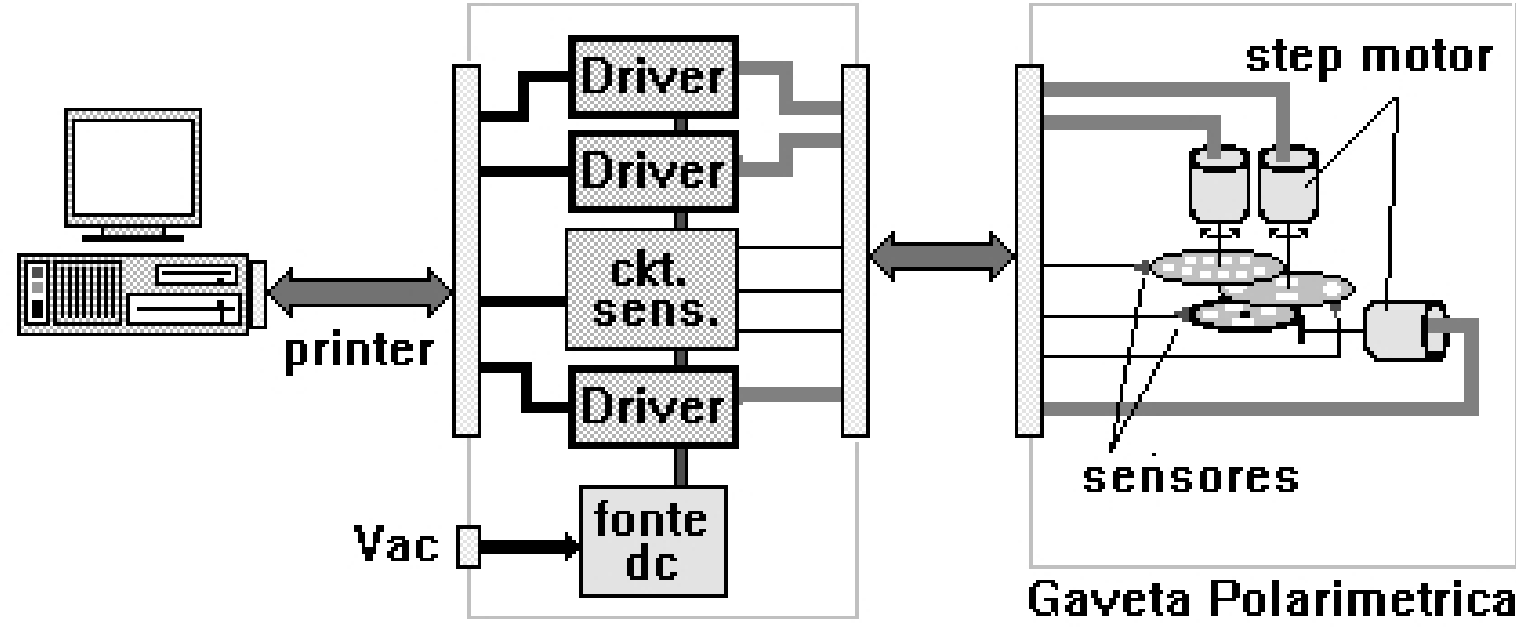
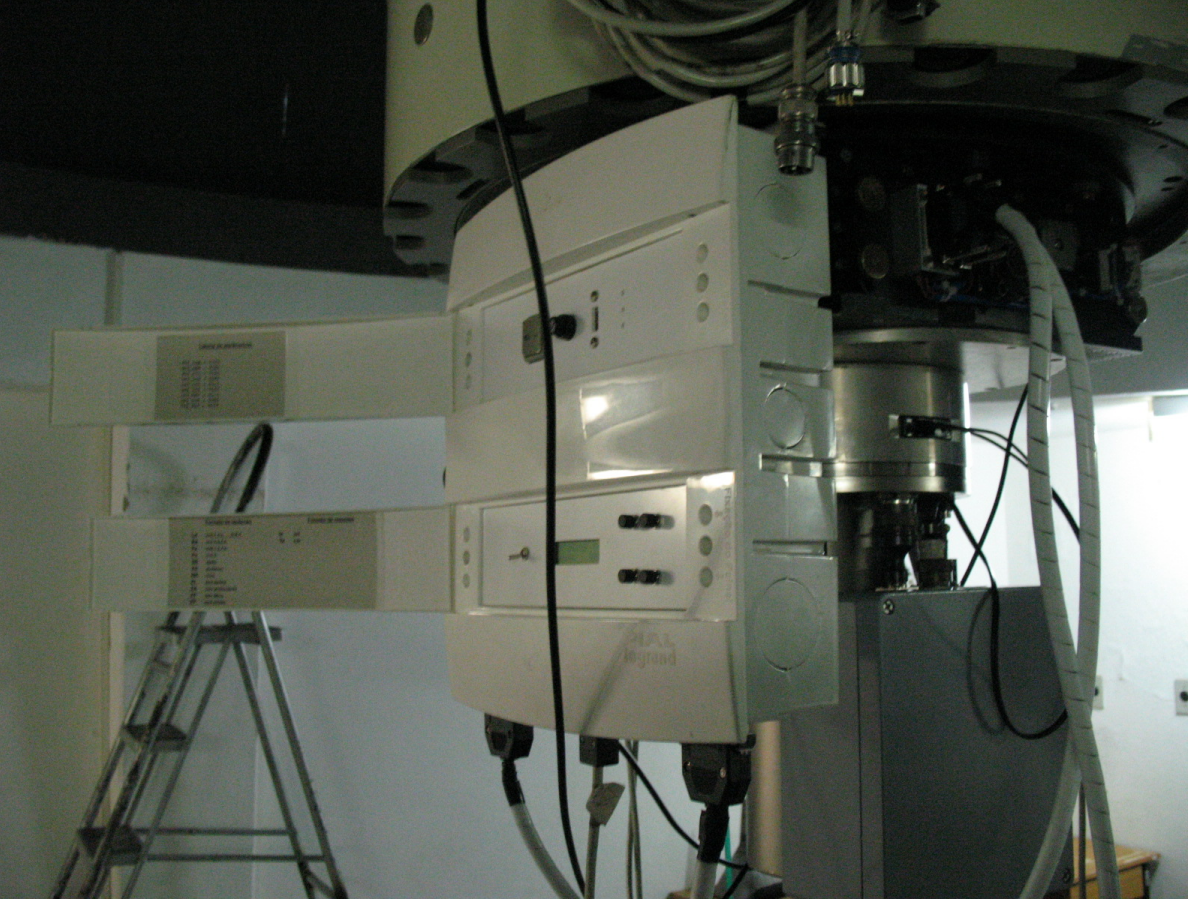
- ▶ Many fields were chosed from the *Heiles (2000) compilation and disposed in the galactic plane*.
- ▶ The polarization (which is the point of this study) is the **polarization of insterstellar absorption** and not the intrinsic polarization of the star.



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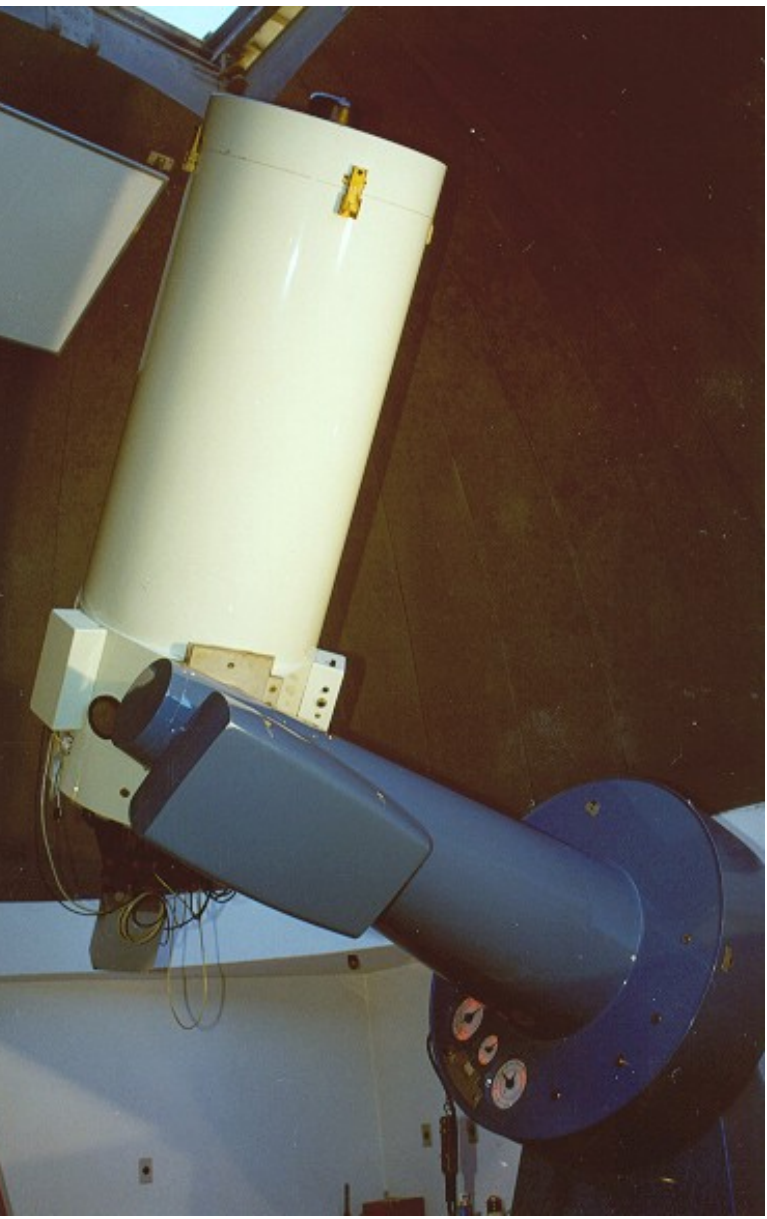
A study of the polarization distribution of the objects could lead for an estimation of **magnetic fields** intensity.

Objective



- ▶ Determination of interstellar polarization for selected fields, with datas from **Laboratório Nacional Astrofísica** observatory using the **Boller & Chivens** telescope.

- ▶ We created a polarimetric drawer for the data acquisition



- ▶ This drawer have some important features, like a calcite for image duplication.
- ▶ The duplication guarantee that in the calculation of the rate of this images, some errors may be eliminated.
- ▶ The drawer have a laminar halfwave ($\lambda/2$) to help the polarization determination.
- ▶ With this drawer, the automation for data acquisition helps the analysis.

- ▶ The main goal of the bunch is to improve the knowledge from the magnetic structure of ISM.

- ▶ Creating a catalog on the part of data, that will be made by using datas and images scanner. This work also will be encompassing the crossing of data obtained with those already existing in another catalogs.

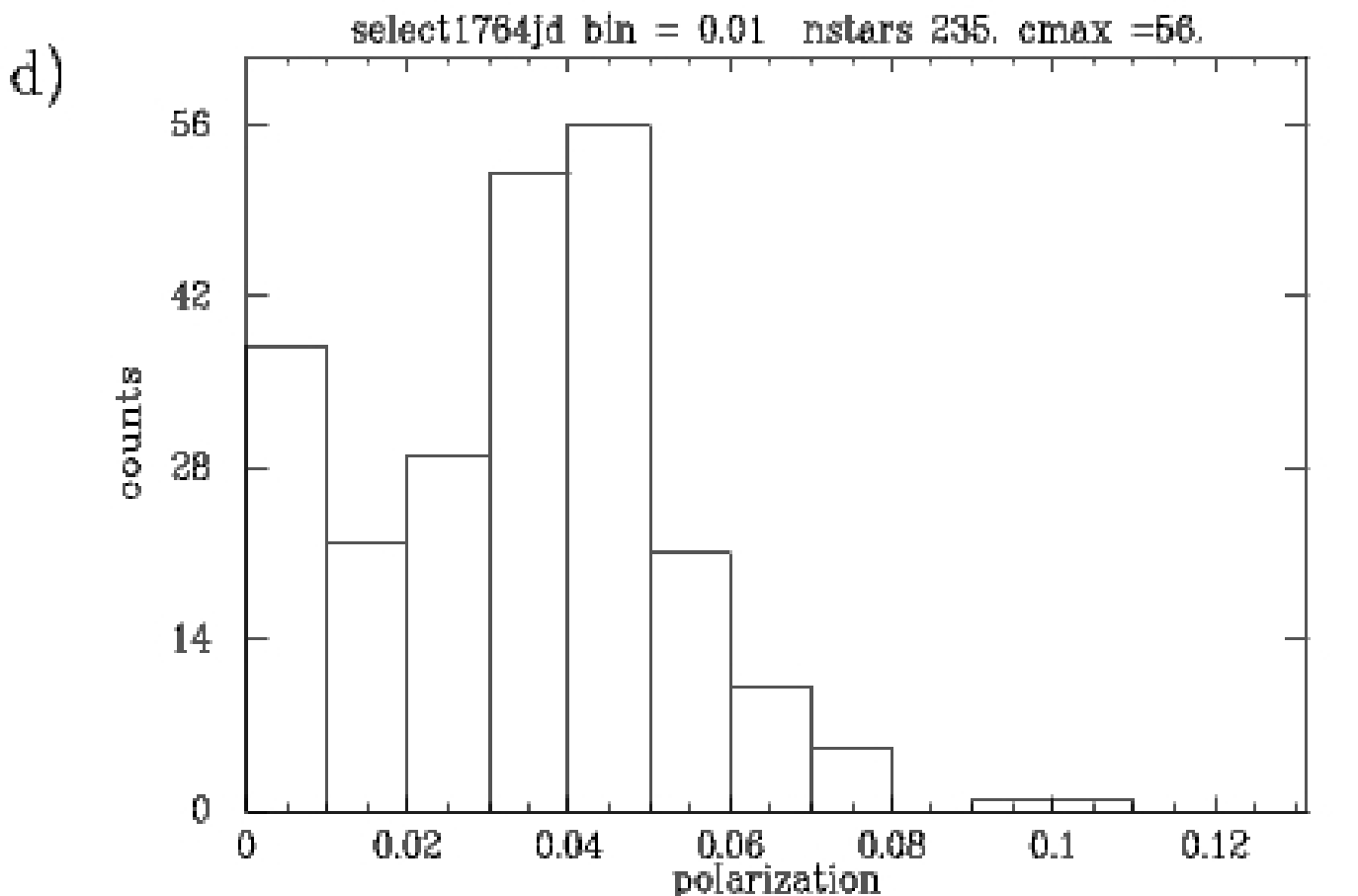
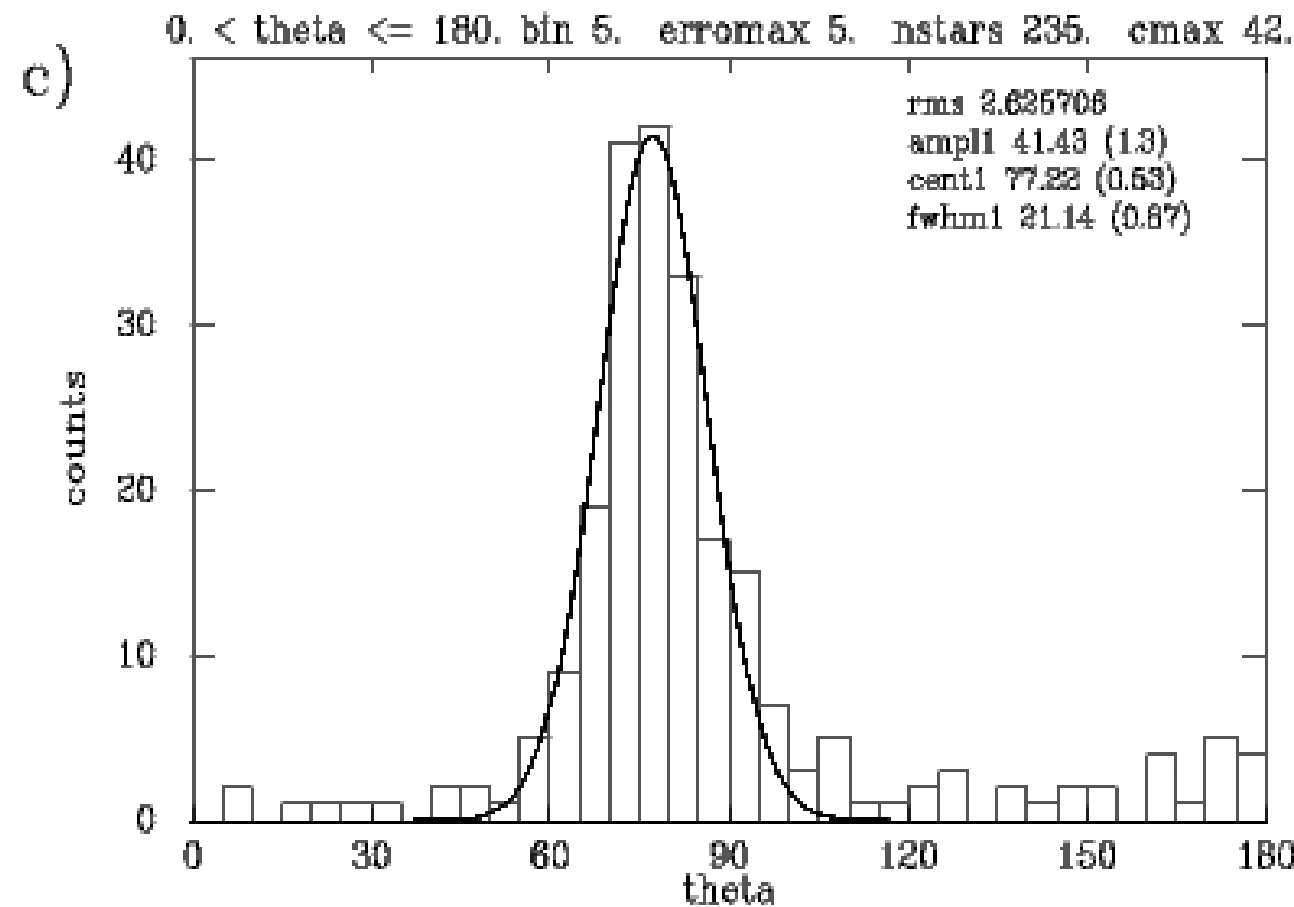
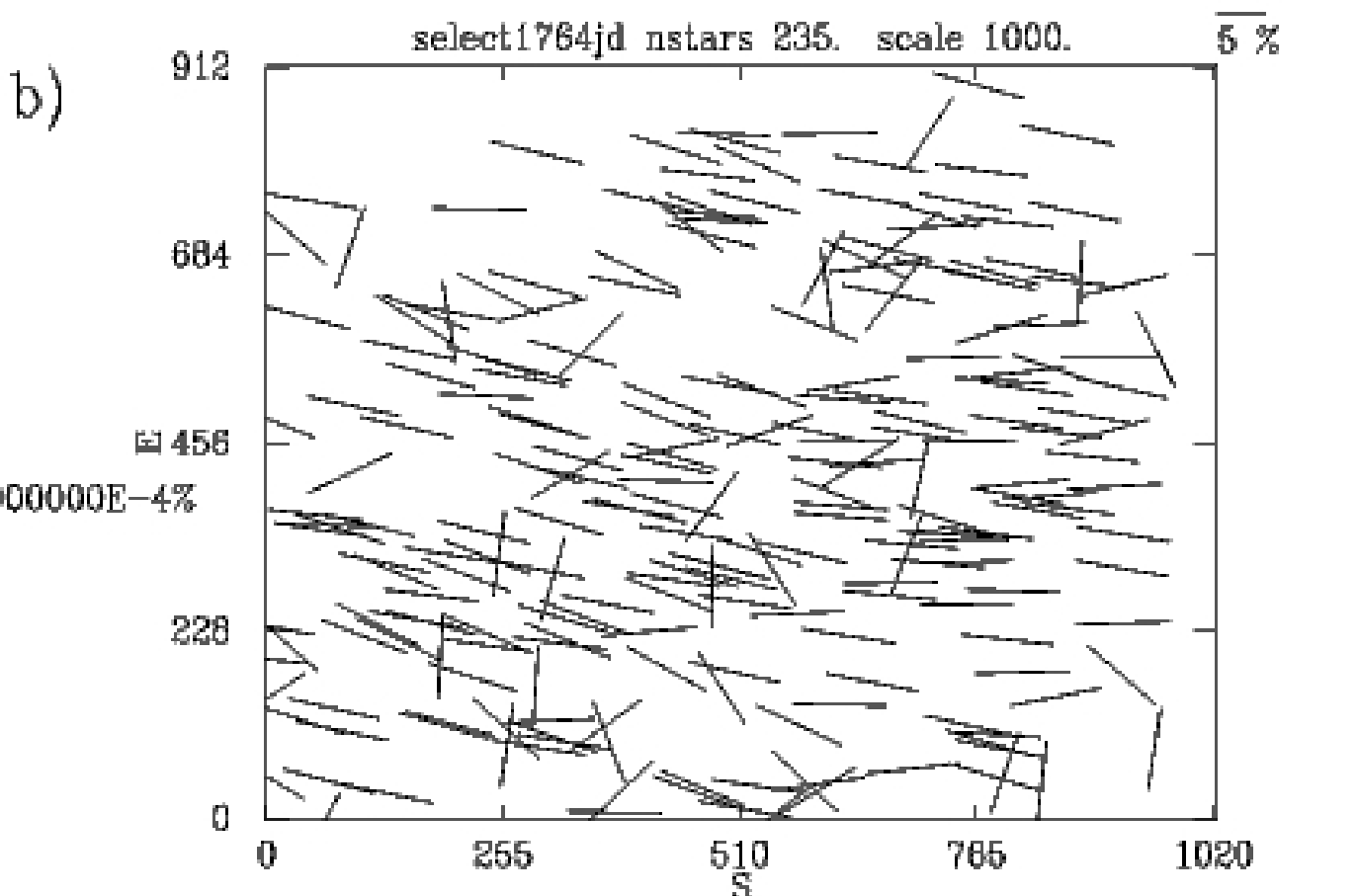
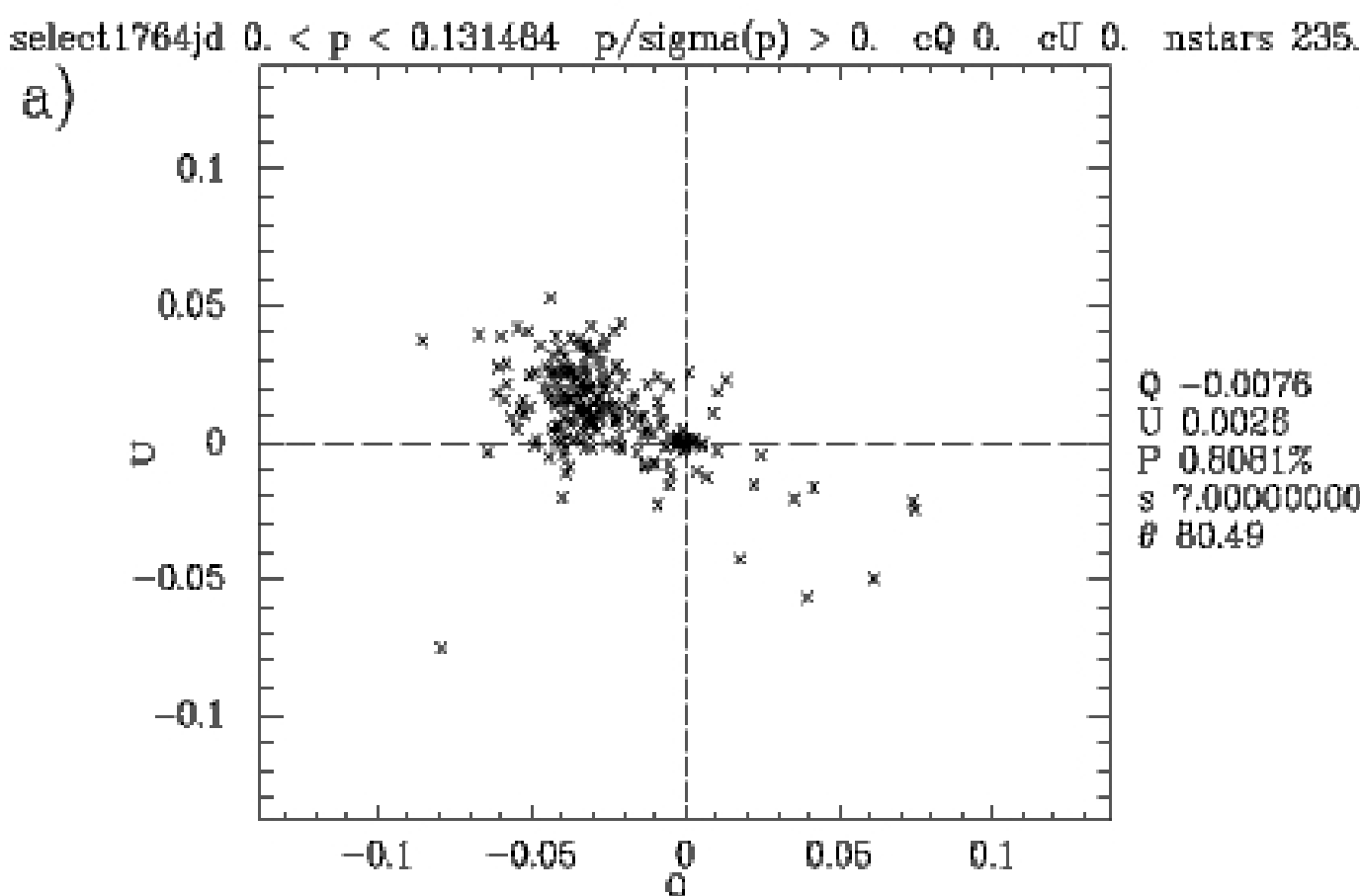
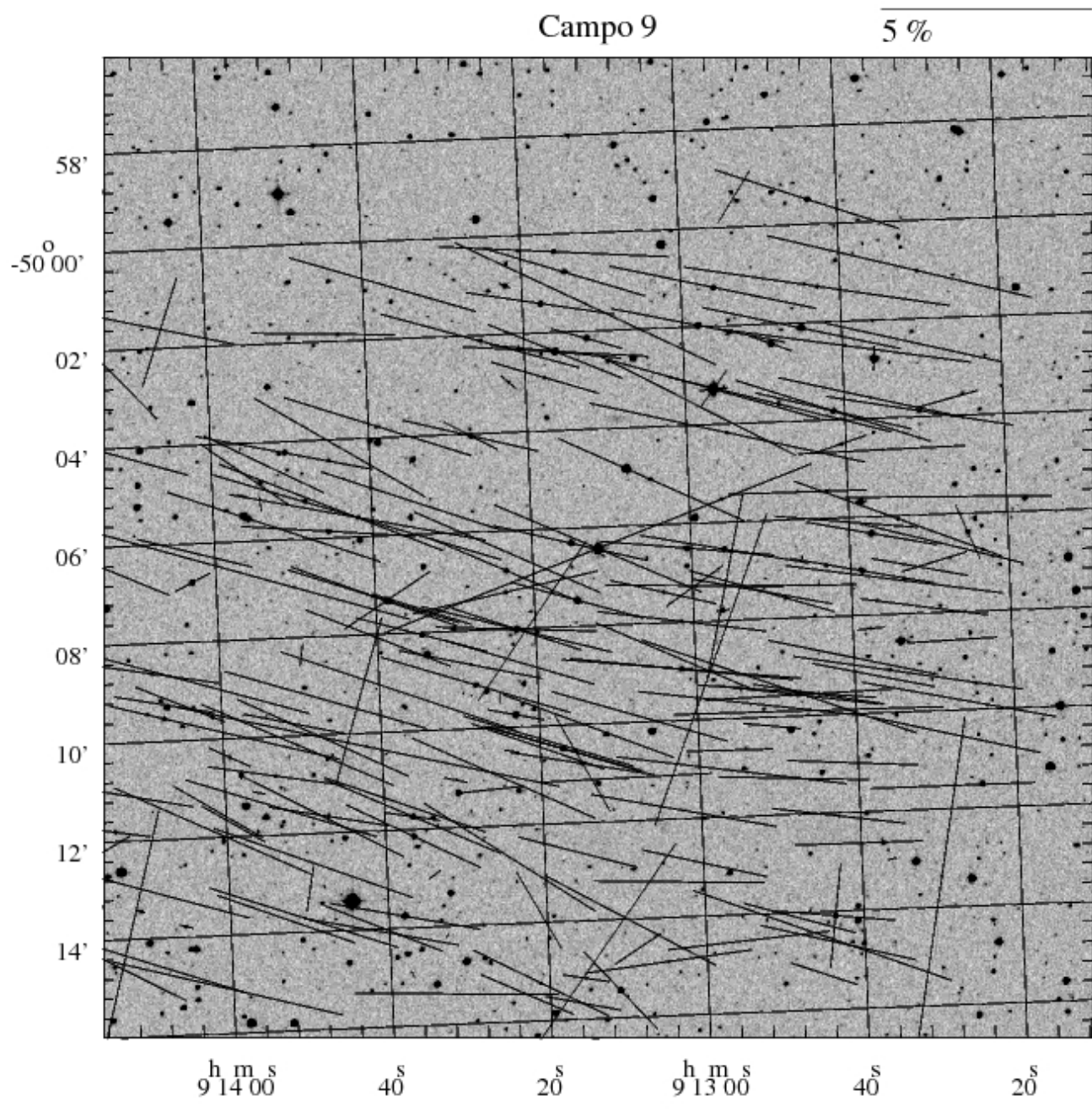


Image Study

QUICKPOL routine from IRAF

Results from QUICKPOL (field 9)

- ▶ **Stokes Parameters**: Graph of parameter U for Q (see in the picture a).
- ▶ **Vectors Graphics**: With the aid from routine it is possible to generate images with the vectors of polarization (see in the picture b).
- ▶ **Angle Polarization Histogram**: (see in the picture c).
- ▶ **Degree Polarization Histogram**: (see in the picture d)
- ▶ It's also possible to obtain a image from the graphic ploatted on the star image.



Magnetic Field Calculation

The magnetic field estimate require a better study of density, velocity and other factors of ISM, for its calculation:

$$B = \frac{(4\pi\rho)^{1/2}\nu}{\Delta\theta} \quad (1)$$

$$B = \frac{1}{2} \sqrt{4\pi\rho \left[\frac{\sigma(\nu_{los})^2}{\sigma(\tan\delta)^2} \right]} \quad (2)$$

- ▶ *Pereyra & Magalhães (2007)*
- ▶ *Wisniewski, Bjorkman, Magalhães & Pereyra (2007)*

▶ where,

- ▶ ρ = density (gcm^{-3}).
- ▶ ν = turbulence velocity motion (cms^{-1}).
- ▶ $\Delta\theta$ in radian.
- ▶ $\sigma(\nu_{los})$ = velocity dispersion int the view line.
- ▶ $\sigma(\tan\delta)^2$ = polarization dispersion.

Conclusions

This work have been done for the study and learn of the IM polarization. This study has the goal of improving our knowledge of the structure of magnetic field in the general ISM. The software packge, *PCCDPACK*, developed by the Polarimetry group at IAG, is being used. Results for one field are presented. The initial results show the method can be quite eficiente and we hope to present additional results in the near future