

Additional science case:

### Goal 1: Galactic Bar kinematics and chemistry:

Inputs for target selection and goals achievement:

- $l=27^\circ$ , number of Red Clump stars (RC) per square deg with  $V < 20$  (see Fig. 1)
- Gaia Proper motion accuracy for the Red clump stars at the  $l=27^\circ$  galactic bar is computed from Gaia Simulator. The goal will be to reach, at least, the same accuracy for RVs using WEAVE
- Distance accuracy for these objects: Gaia parallaxes not enough, IR is needed
- WEAVE can provide kinematics at  $l=27^\circ$  at vertical positions  $\pm 200$  pc. Goal: the scale height of the long bar and its kinematic behavior
- Can WEAVE provide some insights on chemical composition of these objects?

WEAVE requirements:

- Field of view:  $1-2^\circ$
- Target density of Red Clump stars: these fields have density  $\sim 2-5 \times 10^3$  stars  $\text{deg}^{-2}$  (see fig 2)
- V magnitude range (point sources):  $17 < V < 20$
- LR spectra,  $R=5000$ , Ca Triplet,  $S/N > 10$ , RV precision 1-2 km/s
- Crowding (TBC; looking to real images or GSC2.0)

Some figures and numbers:

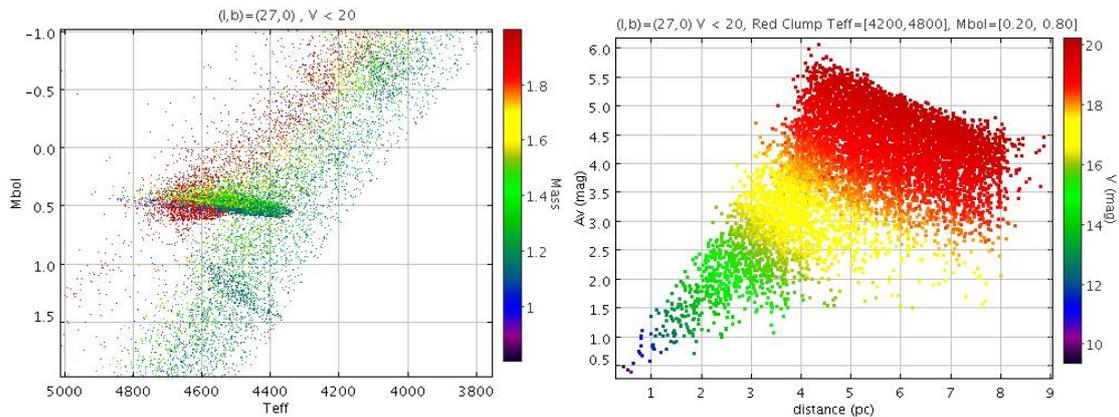


Figure 1 Left: Red Clump selection from the new Besançon Galaxy Model code (Czekaj et al. 2012). RC stars have been selected as those in the range:  $Mbol = [0.20, 0.80]$  and  $Teff=[4200, 4800]$ . Right: Visual absorption versus distance plot colored as a function of the V magnitude. The model provides  $\sim 10^4$  (8186) RC stars  $\text{deg}^{-2}$  at the  $(l,b)=(27,0)$  with  $V < 20$

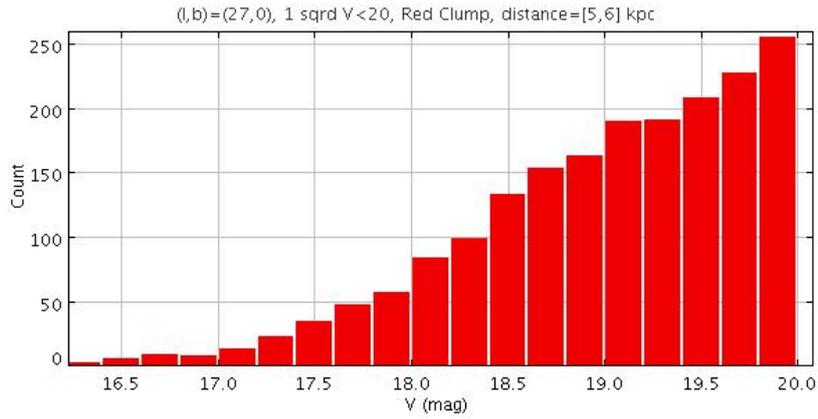


Figure 2 V magnitude distribution of the  $\sim 2000$  (1887) RC stars  $\text{deg}^{-2}$  at  $(l,b)=(27,0)$  with  $V < 20$  at distances  $r=[5,6]$  kpc from the Sun, that is the position where the long bar has been detected (Lopez-Corredoira et al., 200X)

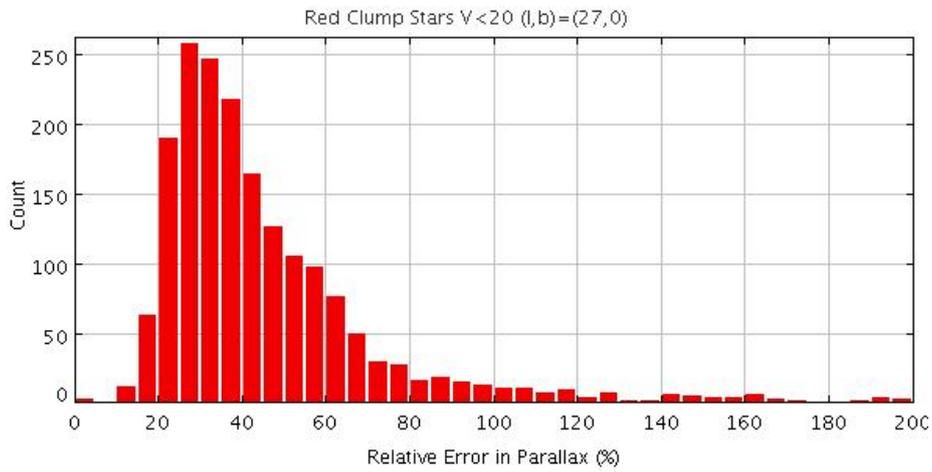


Figure 3 Gaia Relative error in Parallax for the  $\sim 2000$  RC stars  $\text{deg}^{-2}$  at  $(l,b)=(27,0)$  with  $V < 20$  at distances  $r=[5,6]$  kpc from the Sun. Data obtained using Gaia Object Simulator (GOG)

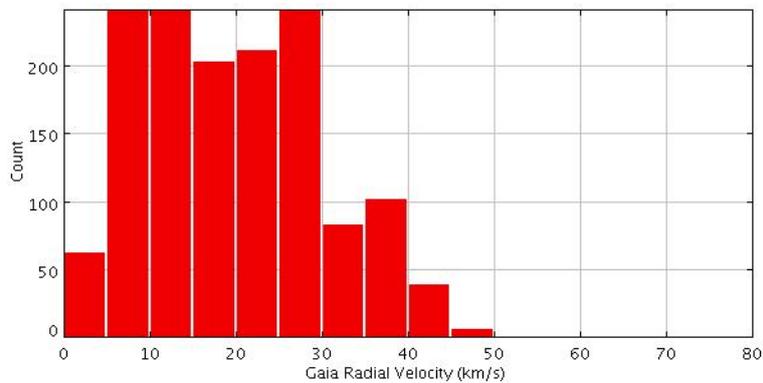


Figure 3 Gaia Radial Velocity Errors from the RVS spectrograph on board for the RC stars. Data obtained using Gaia Object Simulator (GOG)

Additional science case:

## II. Kinematics and chemistry of the galactic Warp:

- Number of Red Clump stars per square deg with  $V < 20$  (see Fig. 1) red clump in the range  $l = [90, 270]$ , centered in the anticenter and  $b = [-15, 15]$
- WEAVE can provide kinematics at vertical positions  $\pm 1000$  pc. Goal: the scale height of the warp and flare and its kinematic behavior
- Can WEAVE provide some insights on chemical composition of these objects?

WEAVE requirements:

- Field of view:  $1-2^\circ$
- Target density of Red Clump stars:
- V magnitude range (point sources):
- LR spectra,  $R=5000$ , Ca Triplet,  $S/N > 10$ , RV precision 1-2 km/s
- HR spectra, Ca Triplet, chemical labeling
- No crowding problems

Some figures and numbers:

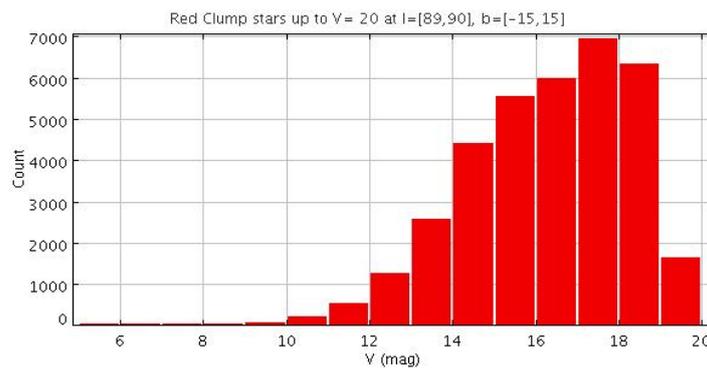


Figure 4 V magnitude distribution of  $3.5 \times 10^4$  RC stars -  $M_{bol} = [0.20, 0.80]$  and  $T_{eff} = [4200, 4800]$  – up to  $V=20$  in the direction of antirotation  $l = [89, 90]$  and  $b = [-15, +15]$ .

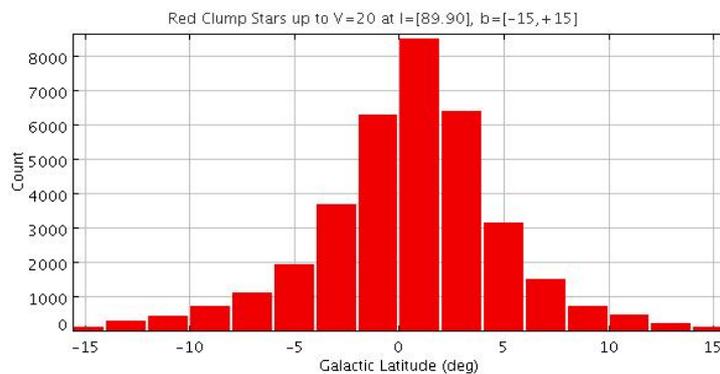


Figure 5 Galactic Latitude distribution of the RC stars up to  $V=20$  in the direction of antirotation  $l = [89, 90]$  and  $b = [-15, +15]$ . Histogram bins correspond to number of stars per square deg. The asymmetry due to the warp in the BGM can be observed

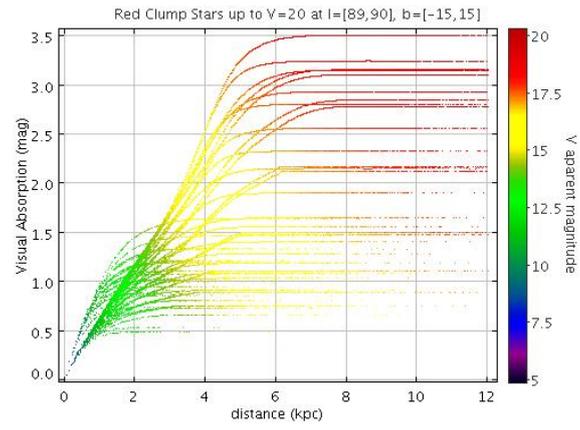


Figure 6 Visual absorption against distance colored with V magnitude distribution