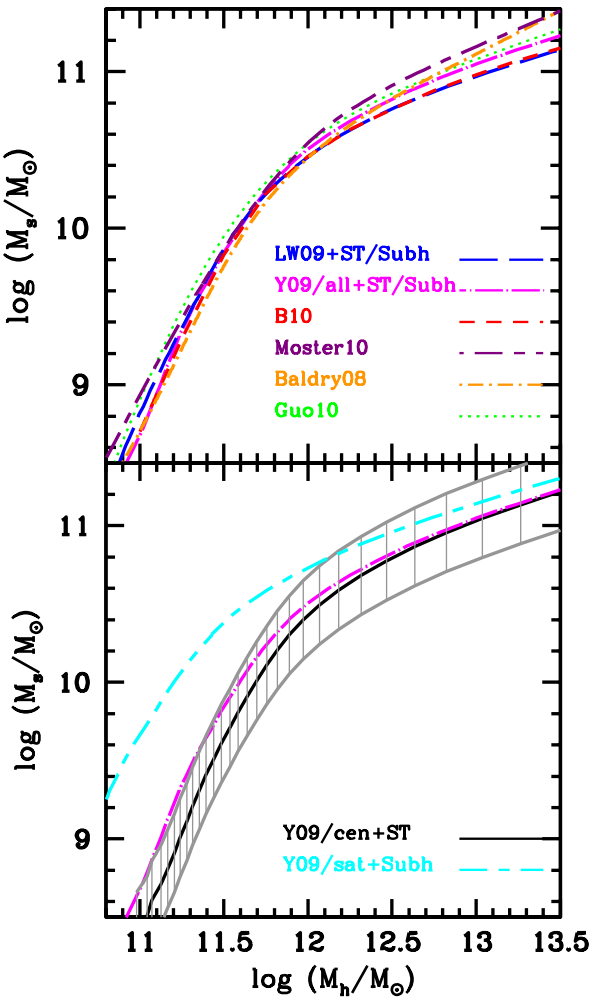

Fig. 4. Upper panel: Stellar mass vs halo mass as inferred here by using the Li & White (2009) overall *GSMF* and the S-T *HMF* increased by the subhalo population (long-dashed blue line) to be compared with the BCW10 inference, who used the same *GSMF* (short-dashed red line). The dot-dashed pink line shows the same M_s vs M_h inference but using the overall YMB09 *GSMF*. Different determinations of the overall M_s–M_h relation by other authors (indicated in the panel), who took into account in different ways the issue of group/cluster masses (see text) are also plotted. Lower panel: Same M_s–M_h relation as in the upper panel (dot-dashed pink line) but for the central-only YMB09 *GSMF* and the S-T (distinct) *HMF* (solid line). The grey curves connected by vertical lines show the estimated 1σ uncertainty for the latter case. The M_s–M_h relation inferred for the only satellite YMB09 *GSMF* and the Giocoli et al. (2010) $z = 0$ sub-halo mass function is plotted as a short-long-dashed cyan line. The color figure can be viewed online.

but only for the central blue galaxies, see § 2.2.1 and the result below). As seen in Figure 4, their correction produces a steeper M_s–M_h relation at the high-mass side than in our case. Moster et al. (2010) and Guo et al. (2010) constrained the M_s–M_h relation by assigning stellar masses to the halos and subhalos of an N-body cosmological simulation in such a way that the total *GSMF* was reproduced. Therefore, by construction, their M_s–M_h relations take into account the group/cluster halo masses issue. The M_s–M_h relations in both works are also slightly steeper than ours at high masses but shallower on average than that of Baldry et al. (2008). Note that in BCW10 the scatter in M_s at fixed M_h was taken into account but the group/cluster halo masses issue was not.

The M_s–M_h relation using the YMB09 *GSMF* only for central galaxies and the distinct (S-T) *HMF* is plotted in the lower panel of Figure 4 (solid black line). At large masses, this relation is quite similar to that for all galaxies/satellites and halos/subhalos (dot-dashed pink line). This is because at large masses the great majority of galaxies are centrals and the correction for sub-halos is negligible (see Figures 1 and 3). At lower masses, the exclusion of satellites and sub-halos implies a lower M_s for a given M_h. This is because the *GSMF* decreases more than the *HMF* as the mass is smaller when passing from the total (galaxy and halo) samples to the central-only galaxy/distinct halo samples. The physical interpretation of this result could be that satellite galaxies of a given M_s have less massive halos than central galaxies, due to tidal stripping. The M_s–M_h relation derived only for the satellites YMB09 *GSMF* and the Giocoli et al. (2010) $z = 0$ sub-halo *HMF* is plotted in the lower panel of Figure 4 (short-long-dashed cyan line).

3.1.1. *Uncertainties*

The uncertainty (standard deviation) in the M_s–M_h relation obtained using the YMB09 central *GSMF* and the distinct S-T *HMF* (solid line), is plotted in Figure 4 (grey curves connected by vertical lines). As remarked in § 2, we did not take into account all possible uncertainty sources in the M_s–M_h relation but have just considered the two following ones:

(i) The systematic uncertainty in stellar mass estimates, which is an uncertainty in the *GSMF*. We assume for this uncertainty a scatter of 0.25 dex (Gaussian-distributed) independent of mass, and propagate it to the M_s–M_h relation (it is by far the dominant source of error in the relation obtained with the AMT, see below and BCW10).

(ii) The intrinsic scatter in stellar mass at a fixed halo mass, which is an uncertainty in the process