and SSWM's resonant fields, as functions of M_s, acquire a negative slope. We take this theoretical dependence on M_s as a signature of dynamic pinning.

We further note that the fields and frequencies for the 10 nm Co bilayer in Fig. 5a can be accounted for with $4\pi M_s = 15080$ G for Cobalt. This value agrees well with a SQuID determined value of $4\pi M_s = 17800$ G for a reference 10 nm thick Co film.

Most interesting in Fig. 5b is not only the shift in resonant fields, but also the significant change in the relative amplitudes of the resonant modes. As stated in the previous section, with a single layer of Py, the amplitude of the first SSWM is relatively constant with respect to the fundamental mode at a constant applied field. However, as shown in Fig. 4b, the bilayer film with just 10 nm of Co on the single Py layer has a significantly different distribution of relative amplitudes. The relative amplitude r_i for a i-th mode is calculated as a ratio of its amplitude to the amplitude of the fundamental mode. This removes the effect of a decreasing precessional angle with a larger applied field. The first SSWM increases in amplitude as the applied field increases, so much so in fact that it has a larger intensity than the fundamental mode. This effect is clearly seen for all samples with Co thicknesses greater than 5 nm, and for the whole range of Py thicknesses studied (40-91 nm).

The theoretical intensities in Fig.5b calculated using the theory in [14] are in good qualitative agreement with experiment. Our theory treats the microwave transducer field as absolutely homogeneous in the film plane. With this and other simplifications used in the theory, a better quantitative agreement is not to be expected. Furthermore, the theoretical intensities strongly depend on a number of material parameters, in particular on layer conductivities and the values the Gilbert magnetic damping parameters for the layers. This makes the task of optimal fitting somewhat complicated, as one has to fit all curves for intensities (Fig. 5b) and all for resonant fields (Fig. 5a) with the same set of parameters simultaneously. No attempt was made to obtain the optimal fit, as the most important task in the calculation in Fig. 5b was to show that the theoretical curves exhibit the same behavior as in the experiment. The calculated relative intensities for SSWMs increase with frequency and, like the experimental data, reach a maximum at higher frequencies (not shown in the graph, as the theoretical maximum for the 1st SSWM is at about 18 GHz). Moreover, the theory fully explains the difference in responses for Si/Py/Co and Si/Co/Py systems (see Fig. 3 in Ref. [14]). Thus we conclude that the eddy currents induced in the bi-layer films by incident microwave fields give a major contribution to the broadband FMR response.