

# Meeting Recap XIX

## March 29, 2018

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- Valentin BESSE.
- Vladimir VLASOV.
- Anton GOLOV.

## Agenda

During this meeting we discuss about:

1. Effectivity of the strain dependant exchange interaction mechanism (see Sec. 1).

## 1 Magnetization dynamics induced by strain dependent exchange interaction mechanism

**Anton** calculate the maximum value of  $m_{z,3}$  as a function of the delay between acoustic pulses (see Fig. 1). We decided to study only magnon mode because it corresponds to the one close to the phase matching frequency ( $\approx 280$  GHz,  $\approx 3.4$  ps) between acoustic's and magnon's dispersion curves. The phase matching frequency corresponds to the highest peak at 3.4 ps. The other one corresponds to the parametric resonant frequency that correspond to the strain dependant exchange interaction mechanism. It is obtained by using a 100% strain amplitude and a series of 20 acoustic pulses. The efficiency of this mechanism is about 1% of the magnetoelastic one.

The figure 2 shows amplitude of  $m_z$  as a function of the time (ps) for different delay between two consecutive acoustic pulses. It appears that the highest peak observed ( $\approx 33ps$ ) corresponds to a delay of 1.9 ps. It is higher than the one for a delay equals that corresponds to the phase matching frequency.

So it means that the it is not the third magnon mode that exhibits the largest dynamics. It is necessary to redo this calculation for other magnon mode and for the FMR.

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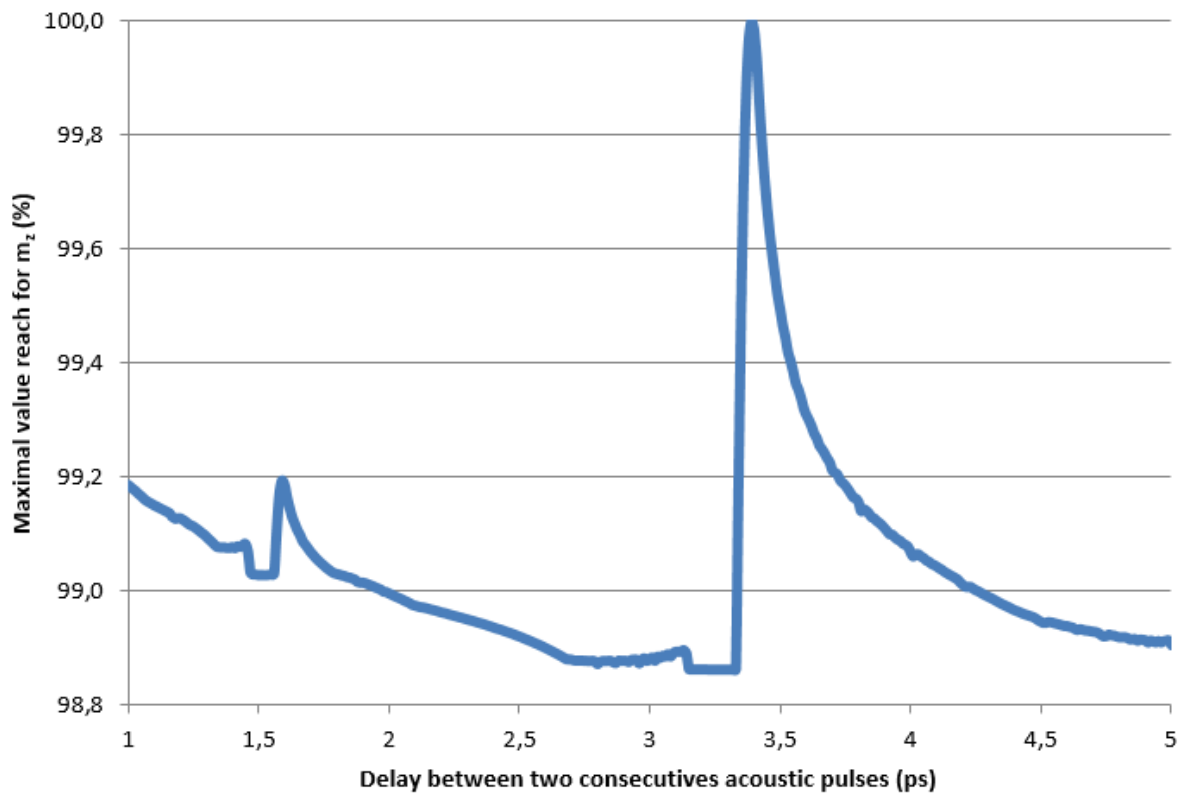


Figure 1: Maximal value reach by  $m_{z,3}$  as a function of the delay between two consecutive acoustic pulses (ps).

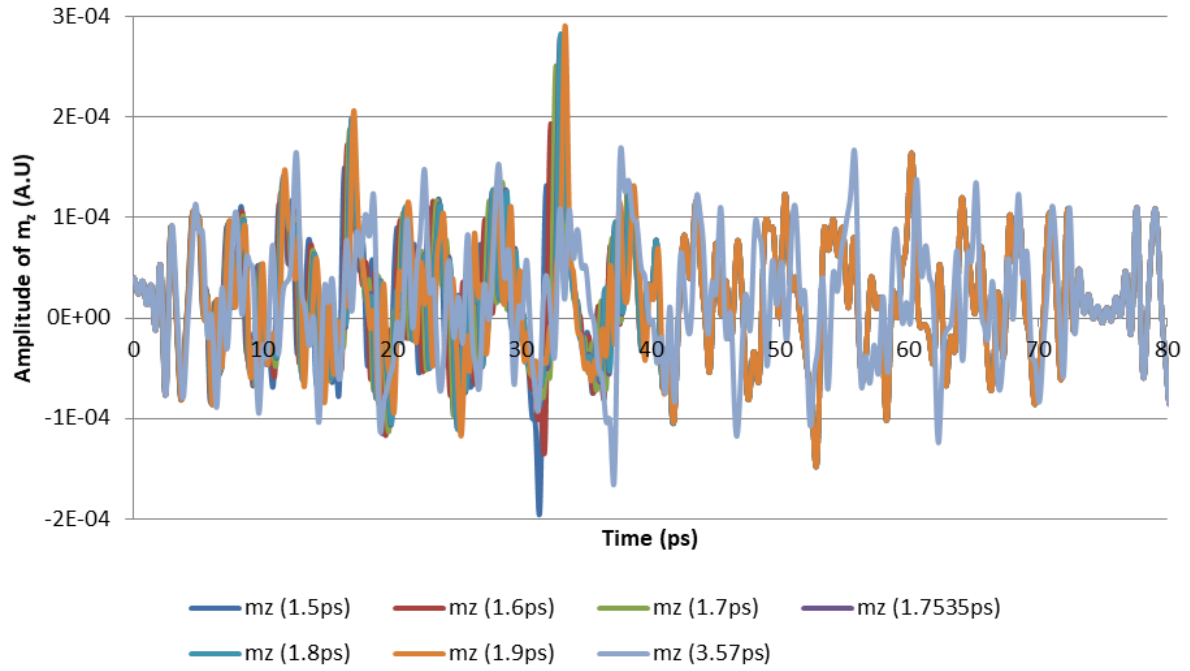


Figure 2: Amplitude of  $m_z$  as a function of the time (ps) for different delay between two consecutive acoustic pulses: 1.5 ps (dark blue curve), 1.6 ps (red curve), 1.7 ps (green curve), 1.7535 ps (purple curve), 1.8 ps (blue curve), 1.9 ps (orange curve) and 3.57 ps (light blue curve).

## New tasks

The new tasks are:

- do the same calculation for the FMR and the five first magnon mode and plot  $m_{z,n}$  as a function of delay between two consecutive acoustive pulses.

## Next meeting

The next meeting will be **Tuesday March 3rd at 12:30 am (CET)**.

## List of abbreviations

Landau-Lifschitz-Gilbert  $\implies$  LLG  
Ferromagnetic resonance  $\implies$  FMR