

1 Introduction

A lot of interest in the scientific community is being generated by the transport of laser excited non-equilibrium electrons. The aim of this work is to broaden the understanding of electron and hole dynamics in heterostructure systems, by using the model system Fe / Au on MgO. The Fe / Au heterostructure is often used in works studying spin ~~resolved electron~~ dynamics [2, 13, 28]. Despite the capability of observing transport dynamics, they were not able to analyse the interplay among relaxation and transport dynamics. **Recently published works** on perovskites have shown the importance of the energy resolved information when trying to understand if the propagation dynamics are ballistic or (*super*)-diffusive [37]. **The novelty of this work is in using *time-resolved* linear Photoemission (*tr*-LPE), in both the established front side pump (FP) geometry to pump and probe on the Au surface, as well as the back side pump (BP) geometry analysing the non-equilibrium transport dynamics by exciting the electrons in the Fe-layer and probing them after propagation through the Au-layer at the Au surface. By varying the thicknesses of the Au-layer this work will attempt to disentangle the effects from the different constituents. This kind of information is highly interesting for applications like solar technology or spintronics.**

