

UP 2020

THE 22nd INTERNATIONAL CONFERENCE
ON ULTRAFAST PHENOMENA



TOPICS: 2D materials

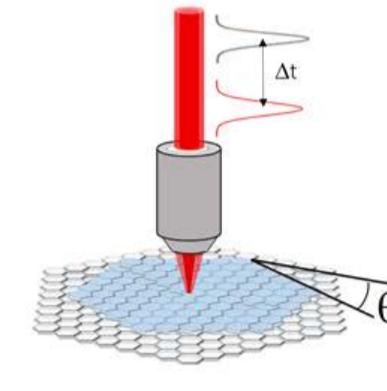
NUMBER: M4A.17

Angle-tunable intersubband photoabsorption and enhanced photobleaching in twisted bilayer graphene

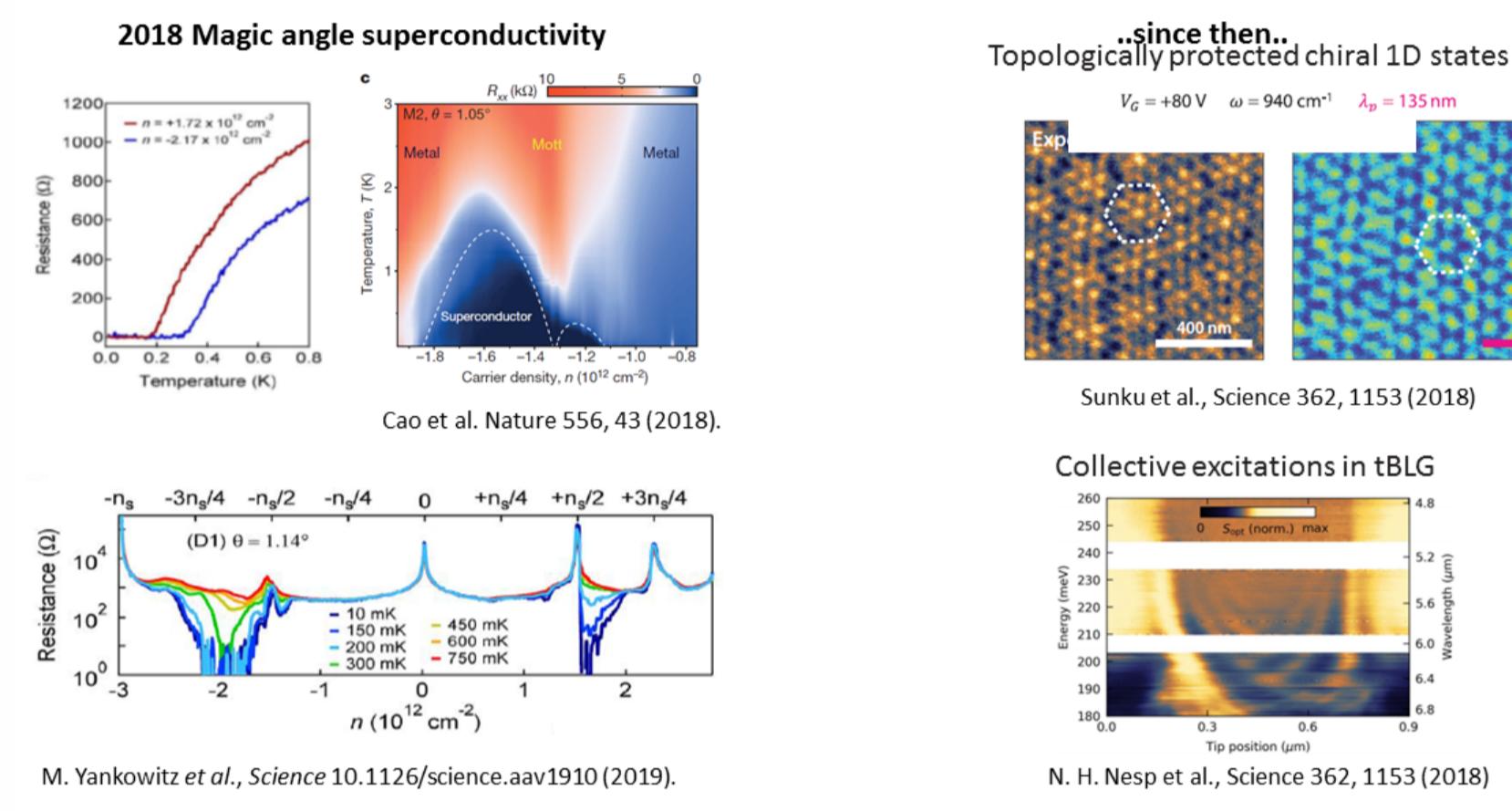


Photoinduced Intersubband Absorption and Enhanced Photobleaching in Twisted Bilayer Graphene

Eva A. A. Pogna, X. Miao, D. von Dreifus, T. V. Alencar, M.V.O. Moutinho, P. Venezuela, P.-W. Chiu, C. Manzoni, G. Cerullo, M. Ji and A. M. de Paula



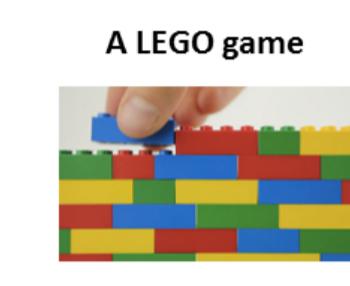
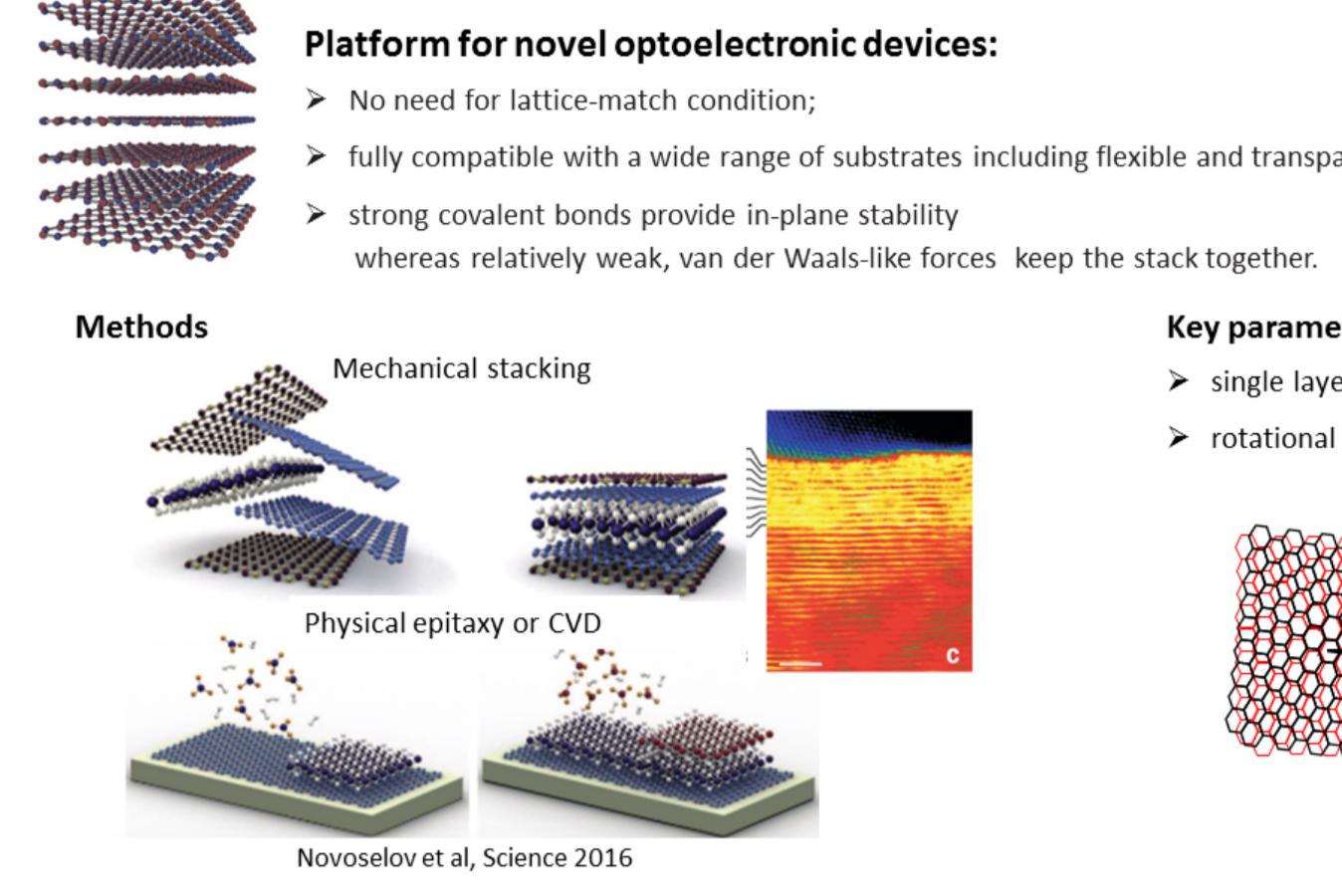
Twisted bilayer graphene



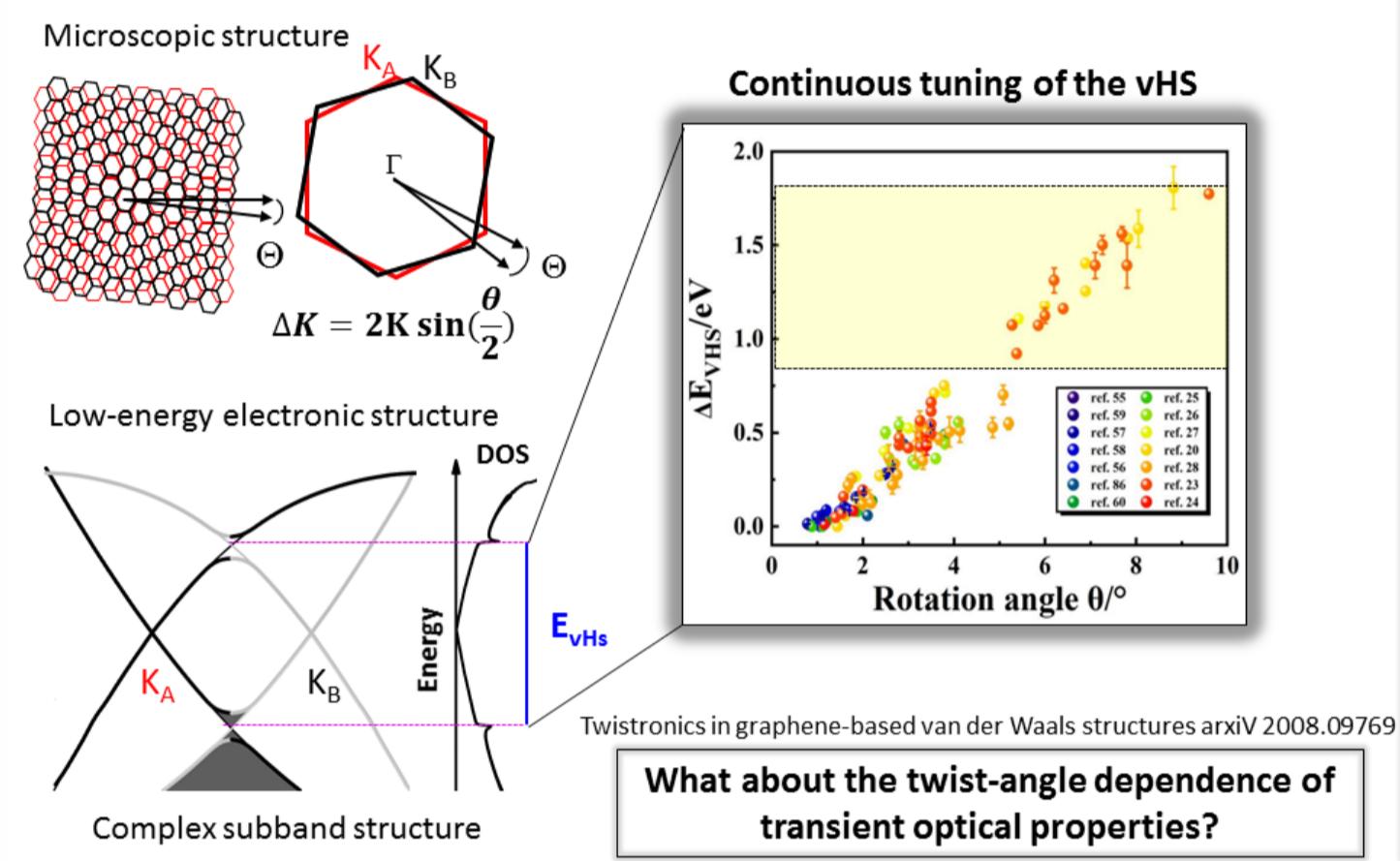
UP 2020

November 16-19, 2020 Virtual Event

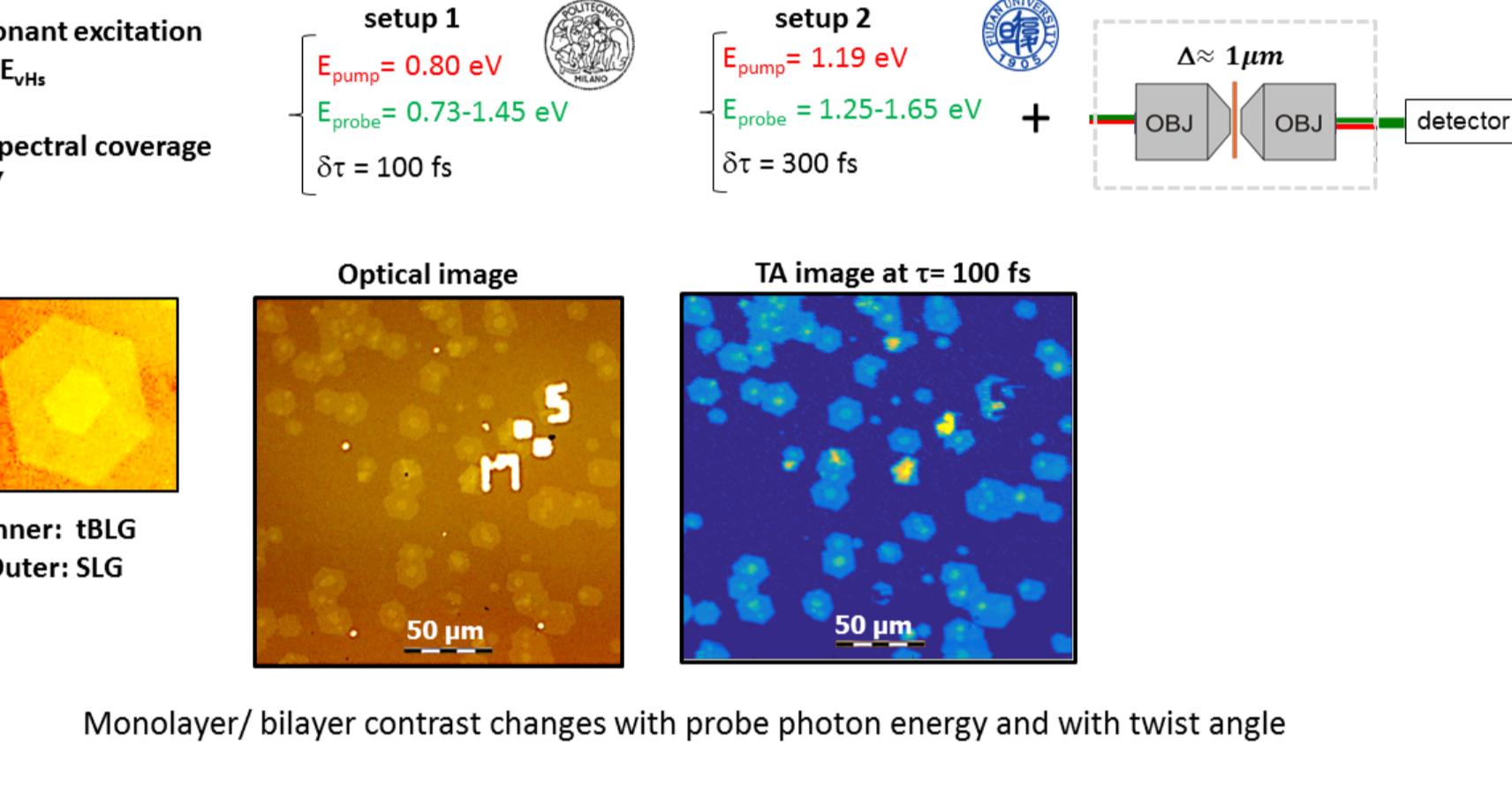
2D vdW heterostructures



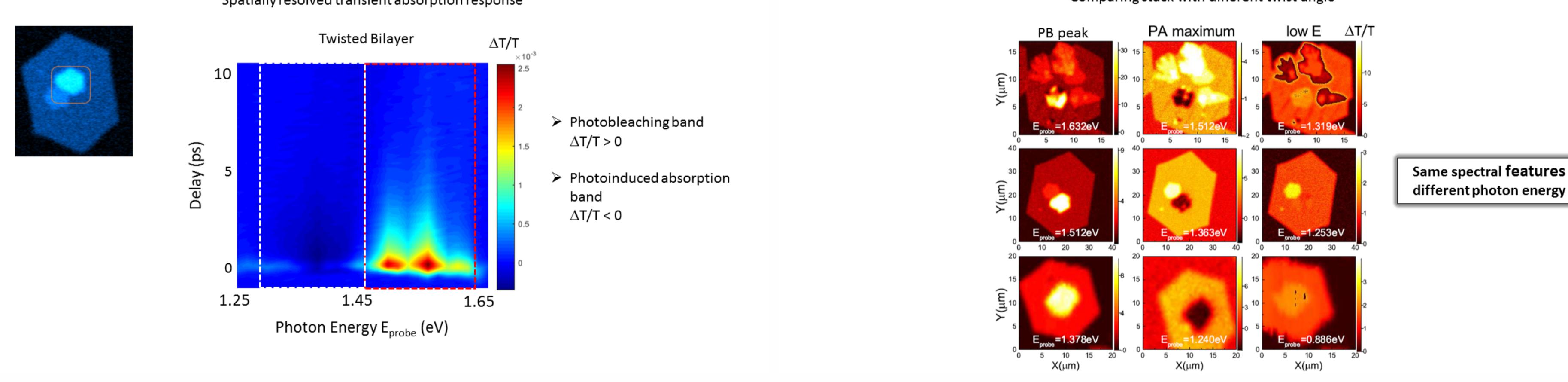
Van-Hove Singularities



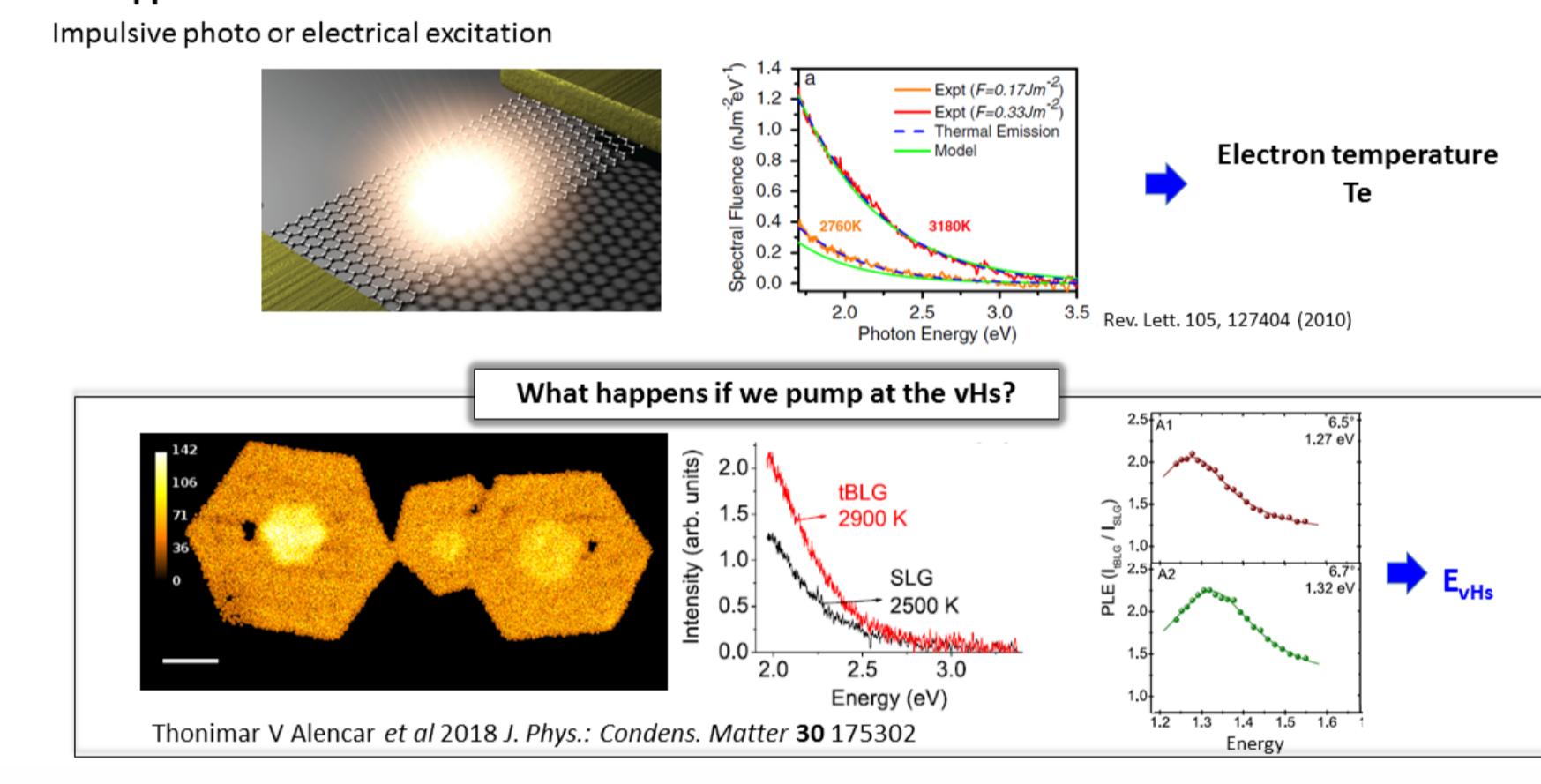
High-sensitivity ultrafast microscopy



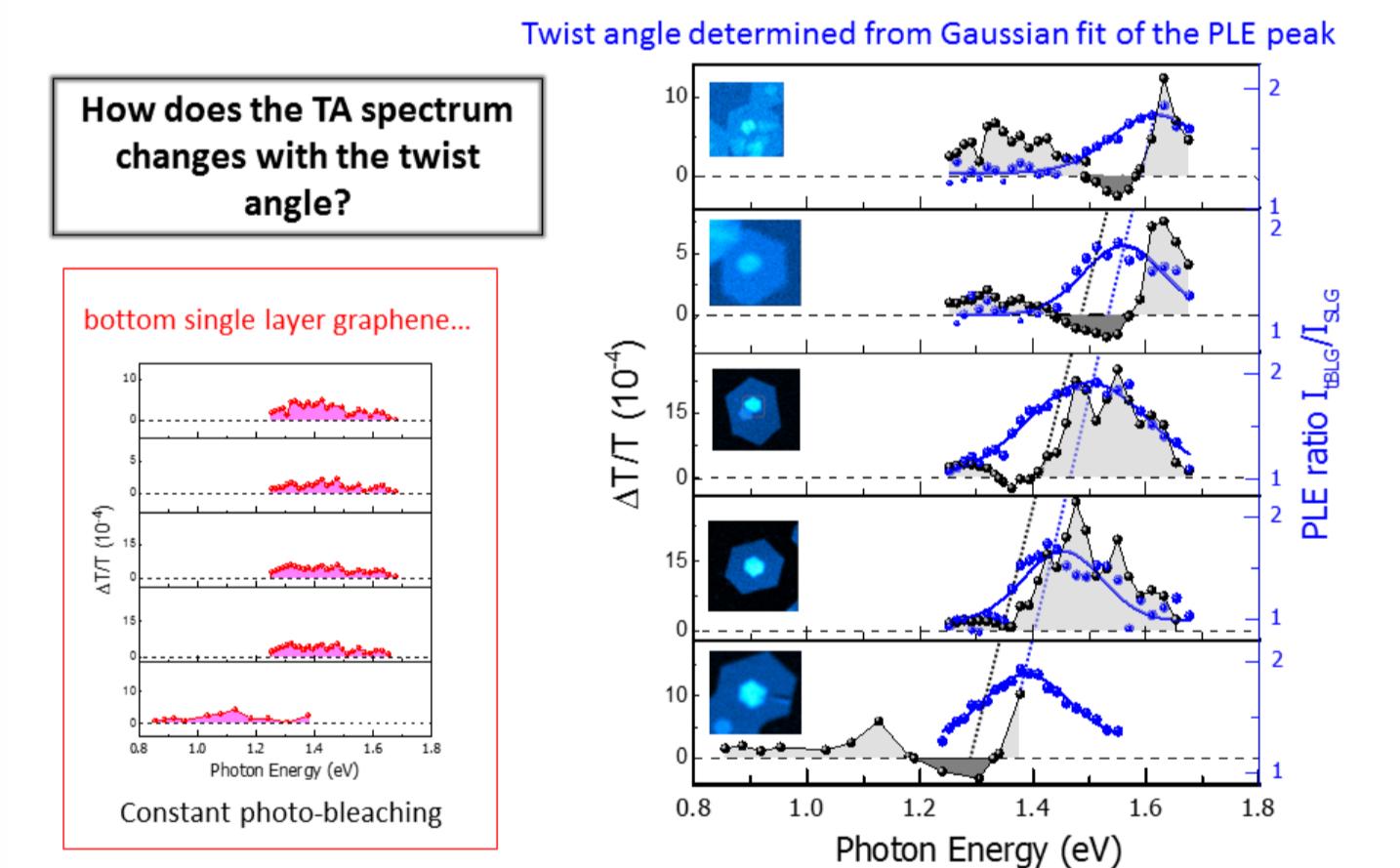
High-sensitivity ultrafast microscopy



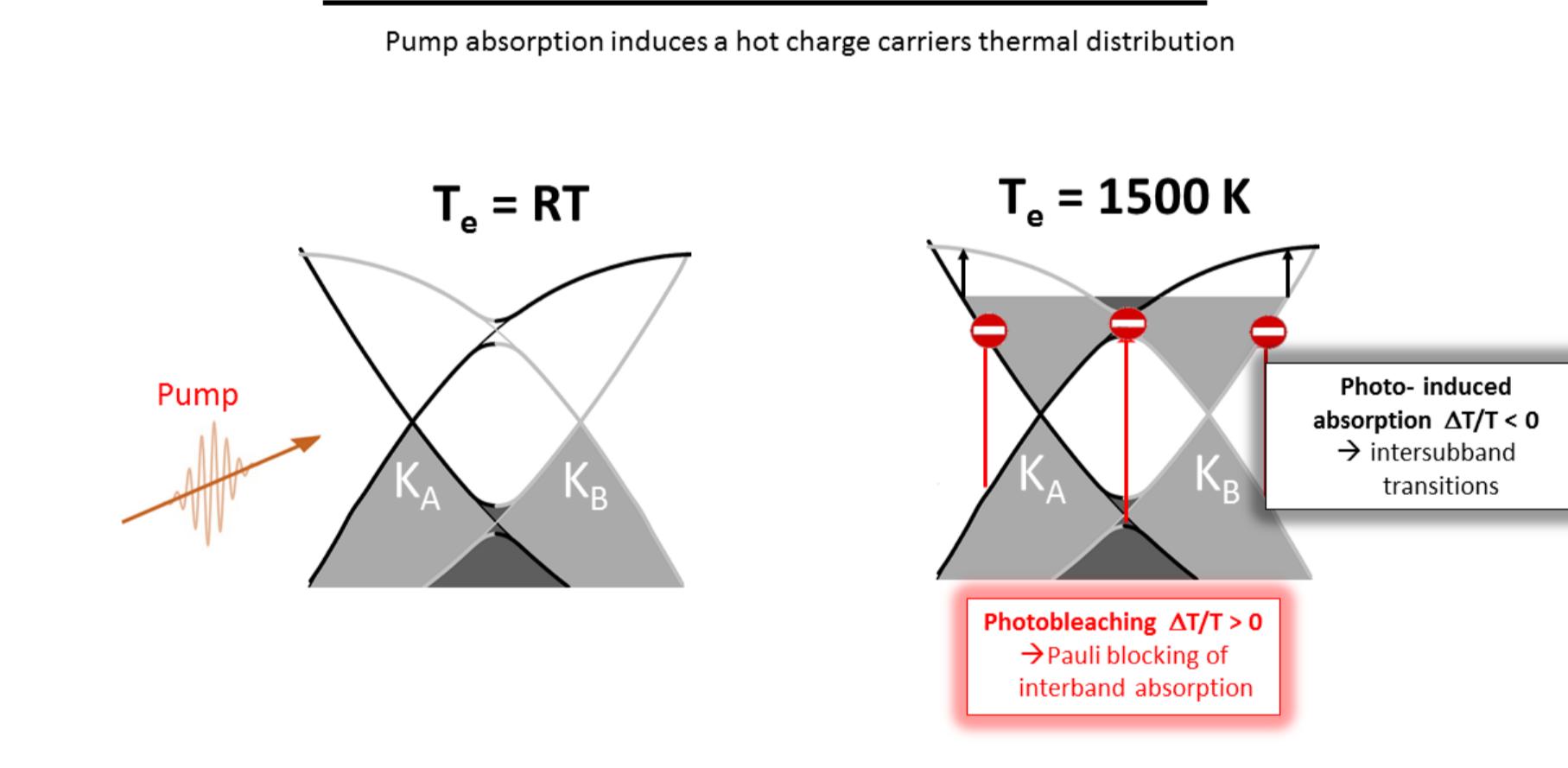
Twist angle determination



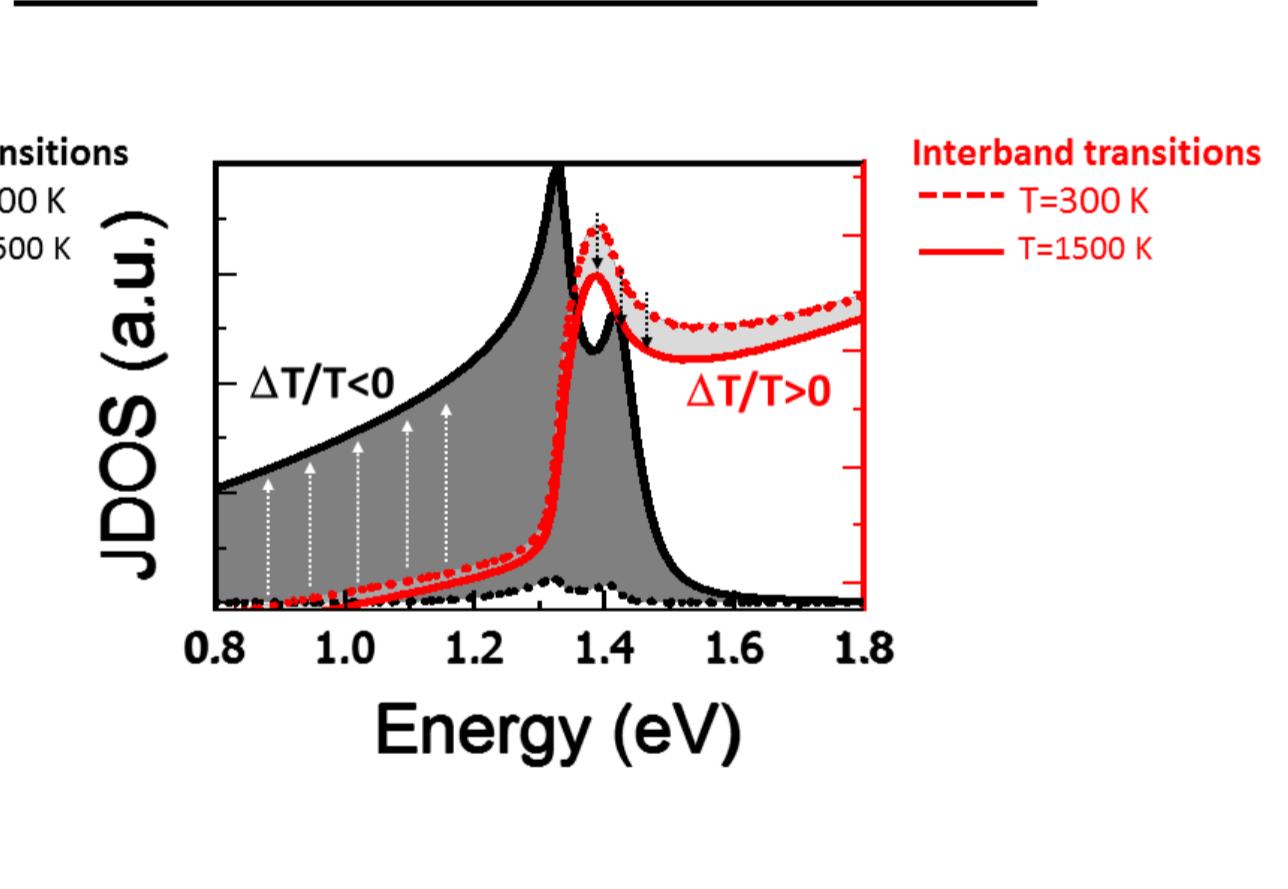
Angle-tunable bleaching and absorption



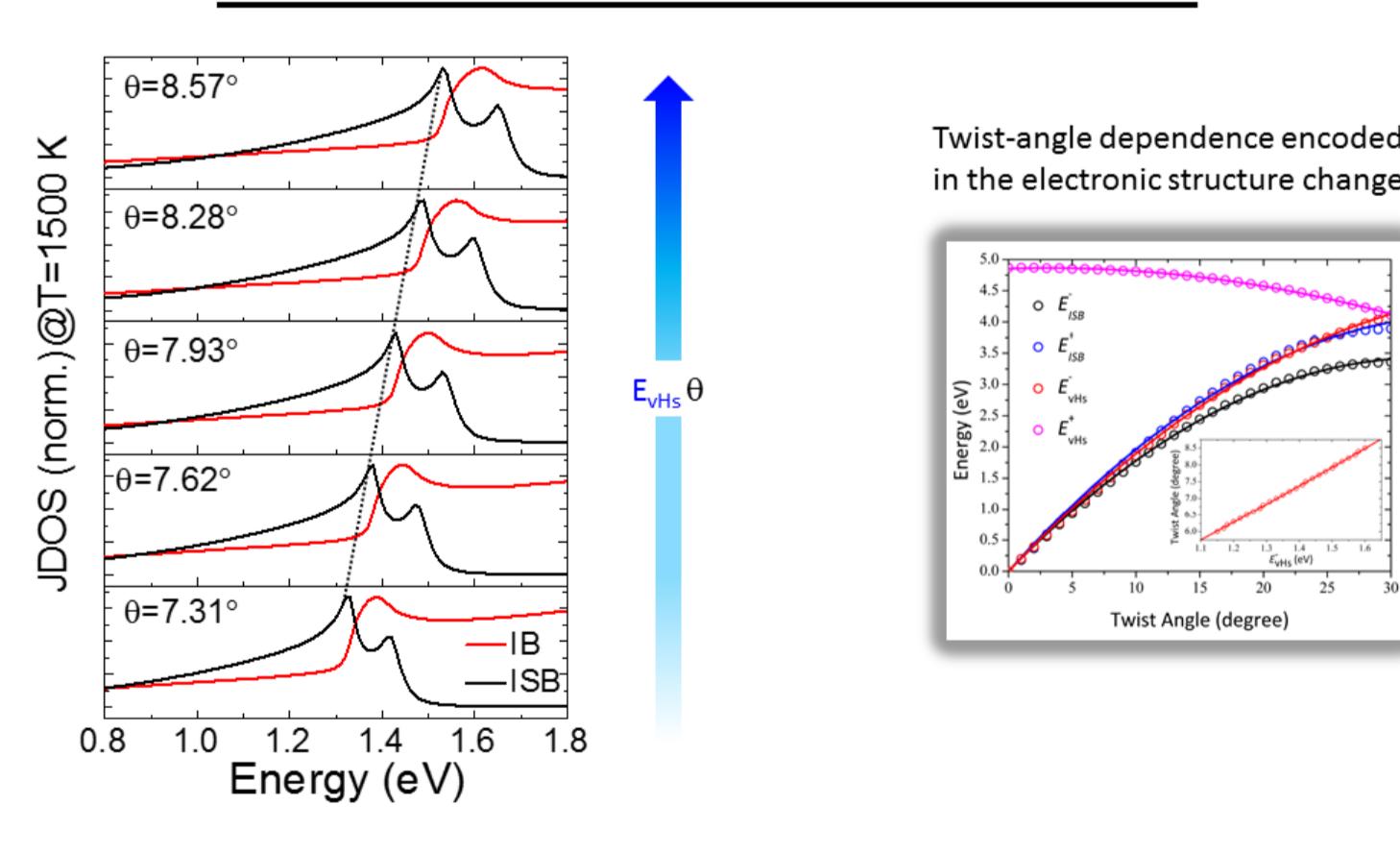
Intersubband transitions



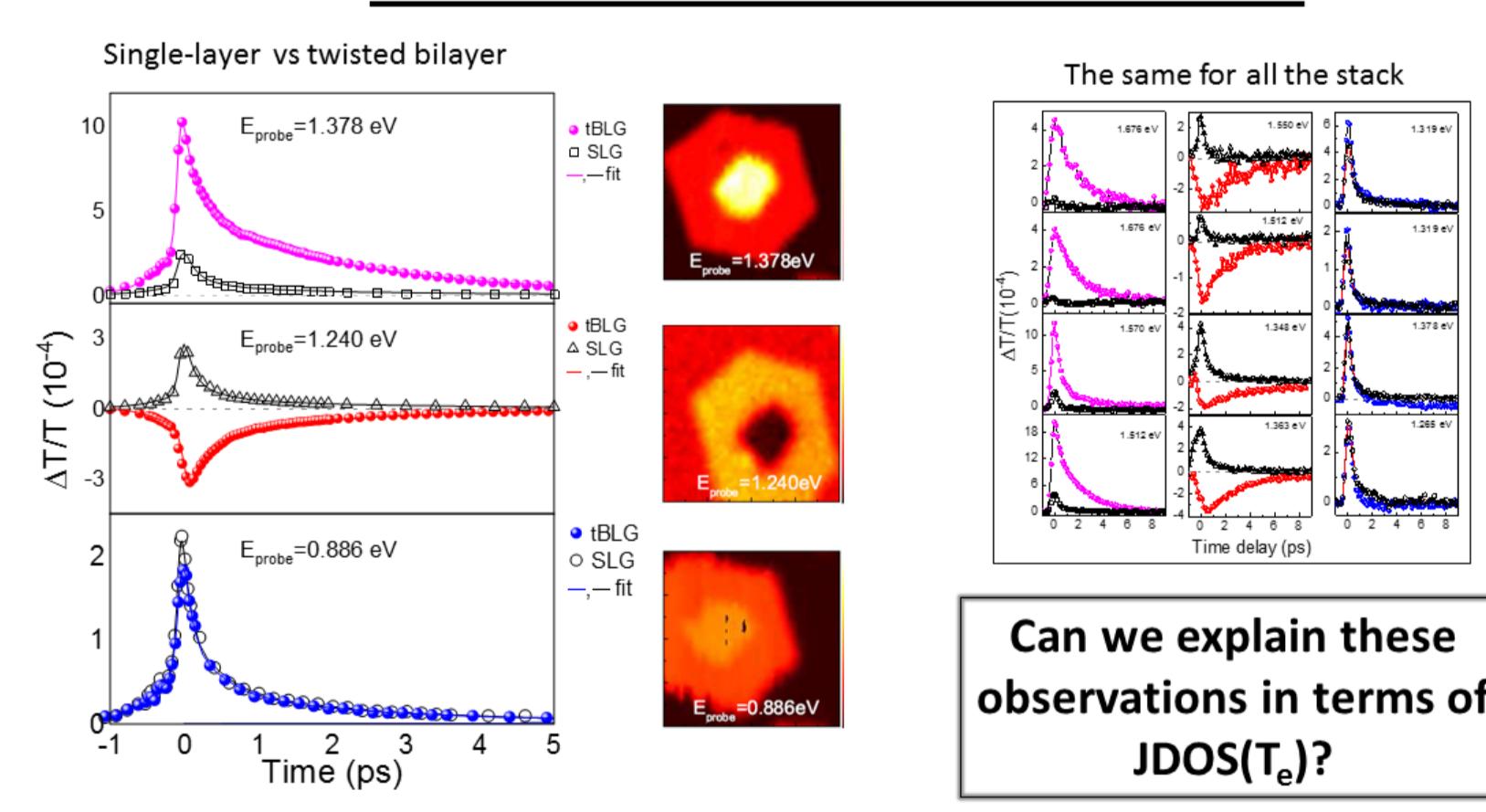
JDOS temperature dependence



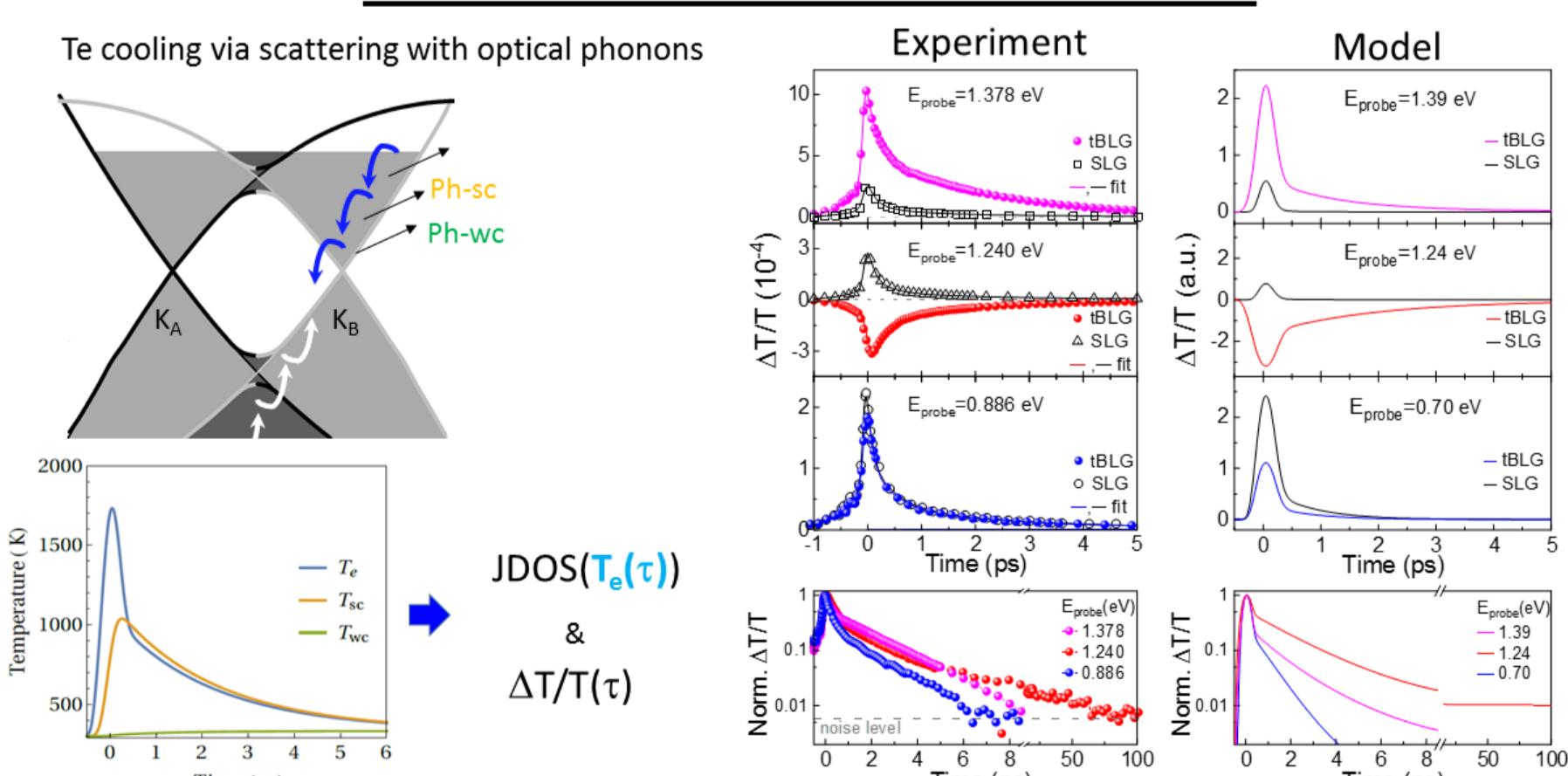
JDOS twist-angle dependence



Relaxation dynamics

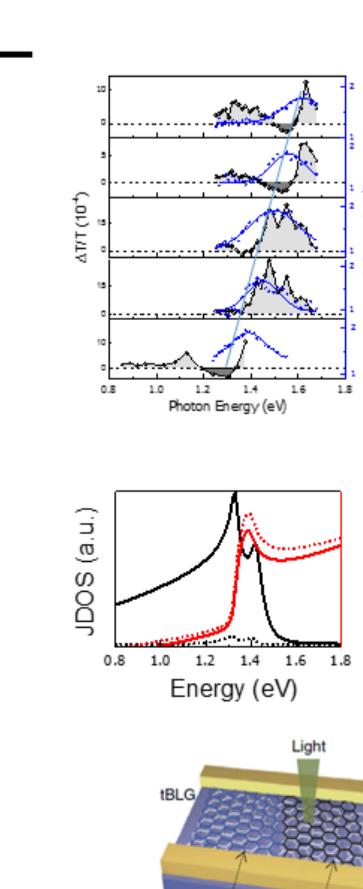


Relaxation dynamics



Conclusions

- Twisted bilayer graphene exhibits angle-tunable transient optical response
- Hot-PLE allows for simultaneous precise determination of the twist angle
- In a regime of low photoexcitation:
-PA band → intersubband transitions
-PB enhancement → DOS peak at vHS
- JDOS variation with Te and twist angle is able to explain the TA dynamics and TA spectrum emerging for the complex subband structure of tBLG
- Perspectives**
Results are extendable to larger twist-angle ranges
Pave the way for optoelectronic applications relying on hot-charge carriers



Acknowledgments

- Prof. Minbiao Ji
Dr. Xianchong Miao
UFOP
Prof. Pedro Venezuela
Prof. Marcus V. O. Moutinho
Prof. Giulio Cerullo
Dr. Cristian Manzoni
CNR-Nano Pisa Italy