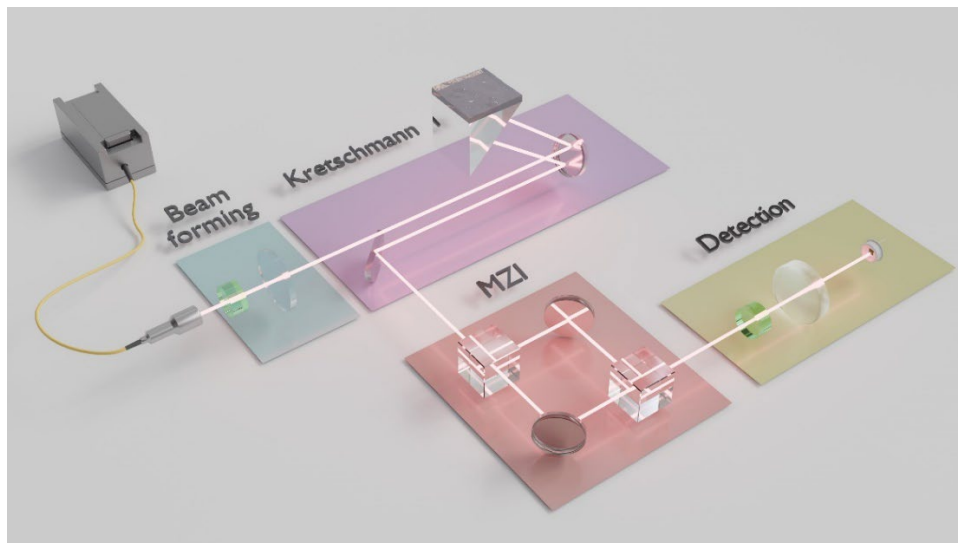


*Master's Thesis*

## Sensing Sound with Plasmons – Plasmonics-Based Photoacoustics

Using the photoacoustic effect, which was discovered in 1880 by Alexander Graham Bell, one can build devices that combine the advantages of both, ultrasound and optical imaging techniques. By relying on the absorption of focused laser light, high spatial resolution can be achieved, while retaining the functional information that can be gathered from using different laser wavelengths. Combining this with the almost undisturbed propagation of ultrasonic waves in biological tissue makes for a great biomedical imaging technique.

One area of research within the domain of photoacoustics is the advancement of ultrasonic sensors. While commonly used piezoelectric sensors perform very well under many circumstances, they have some drawbacks, especially when it comes to their rather bulky size and their limited frequency bandwidth. One way to overcome these restrictions is using plasmon-based sensors that are sensitive to small changes in refractive index. The main part of these sensors is a layered system where surface plasmons are excited at a metal-dielectric interface using a laser beam. By monitoring optical intensity or phase changes, one can directly infer changes in the refractive index of the dielectric material induced by the sound waves.



We are looking for a highly motivated master's student, willing to help us in the endeavor of searching for novel methods to exploit surface plasmons for the measurement of ultrasonic signals. This includes gaining an understanding of the theoretical fundamentals, performing numerical simulations, and, of course, conducting experiments. If you are interested in working at the forefront of research in light-sound-matter interactions and sensor development, using cutting-edge equipment and being part of an incredible team, don't hesitate to contact us.

**Interested! Please send your application (CV, certificates) via email to**

Dorian Brandmüller: [dorian.brandmueller@uni-graz.at](mailto:dorian.brandmueller@uni-graz.at)

Dr. Robert Nuster: [ro.nuster@uni-graz.at](mailto:ro.nuster@uni-graz.at)

Prof. Dr. Peter Banzer: [peter.banzer@uni-graz.at](mailto:peter.banzer@uni-graz.at)