

Plane-wave Expansion based modelling of Cassegrain-type Reflective Objective

Development and validation of a plane-wave expansion based model to precisely emulate the effect of modified excitation from a Cassegrain-type reflective objective in linear and non-linear optical responses.

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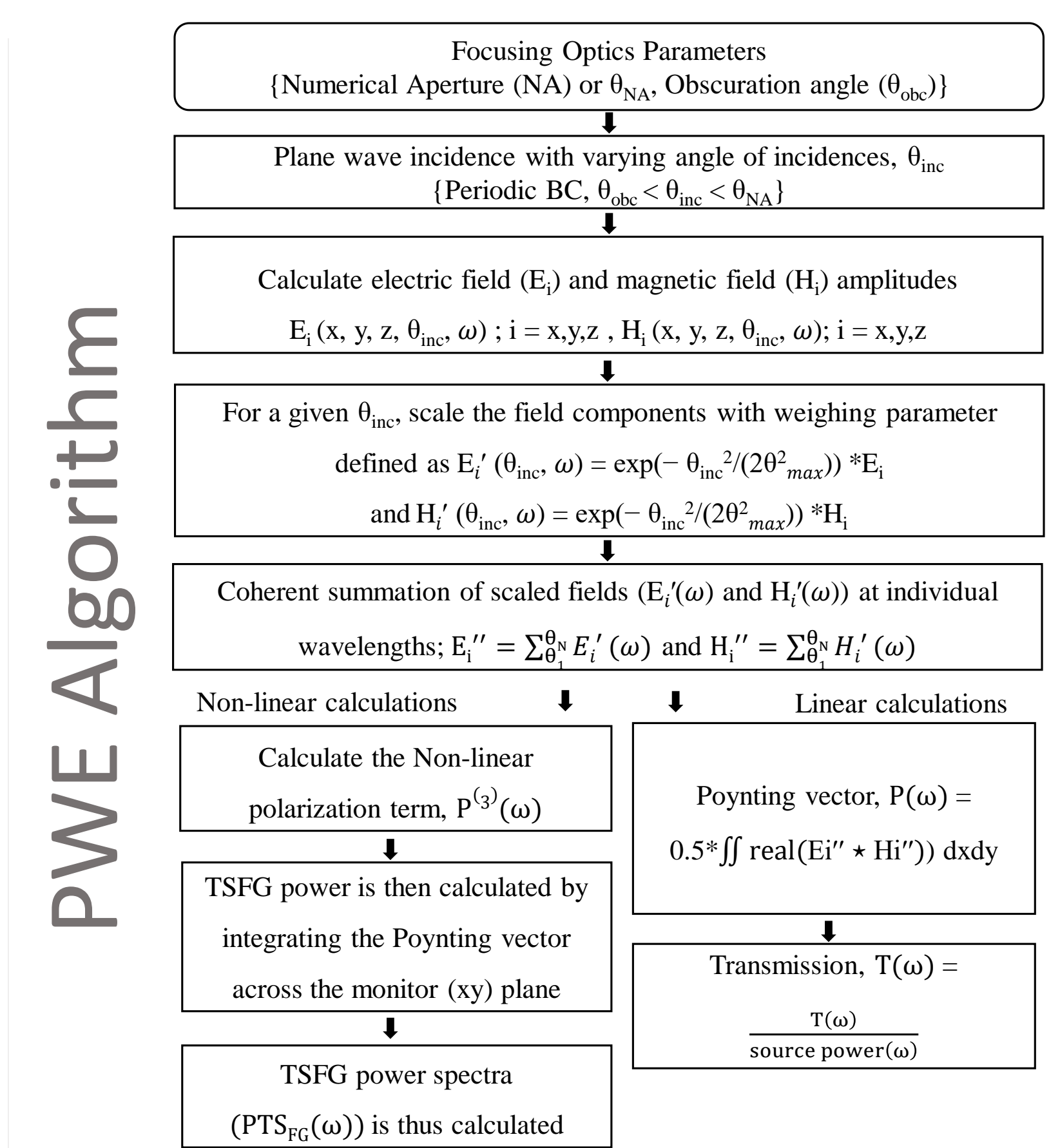
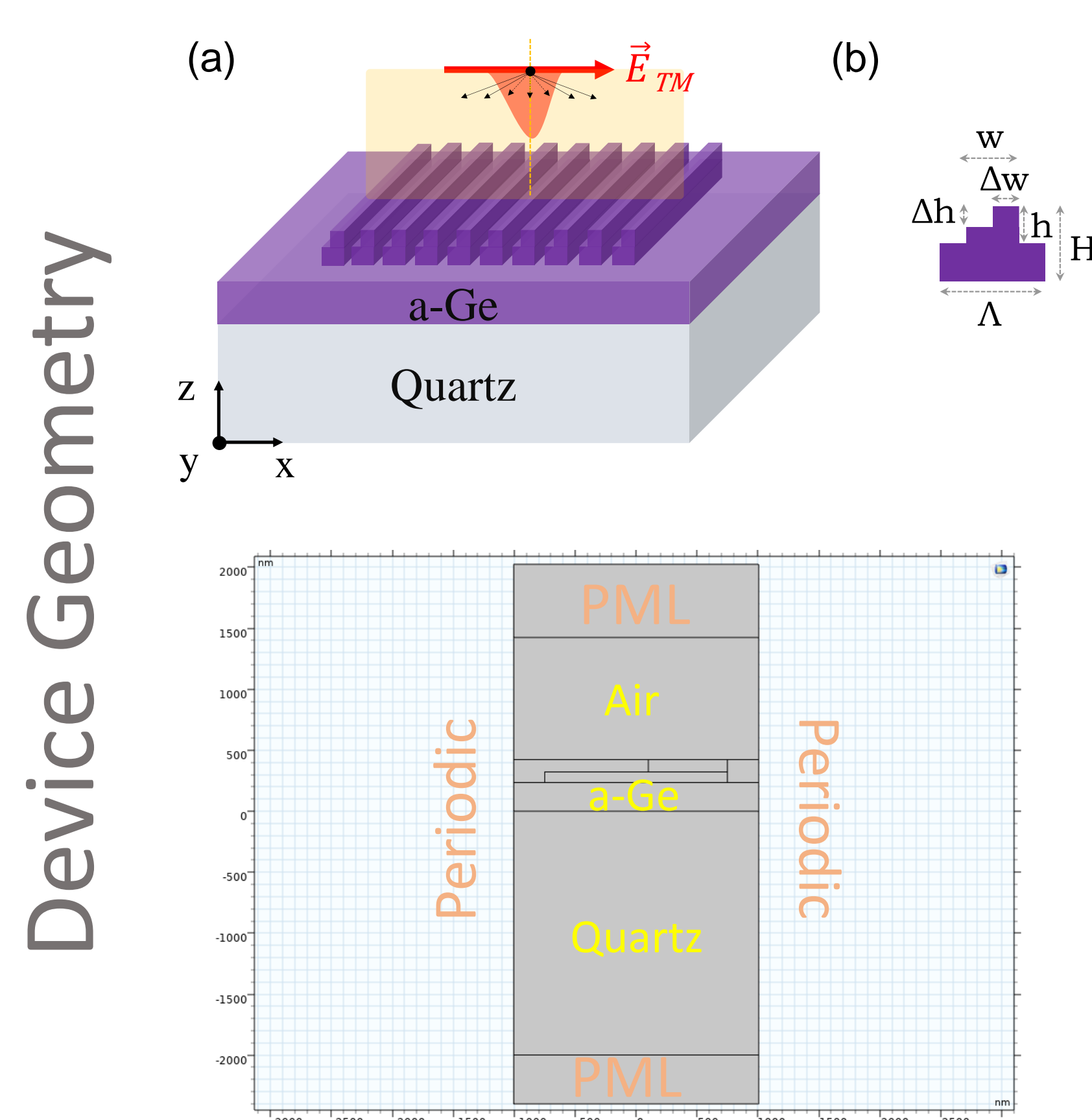
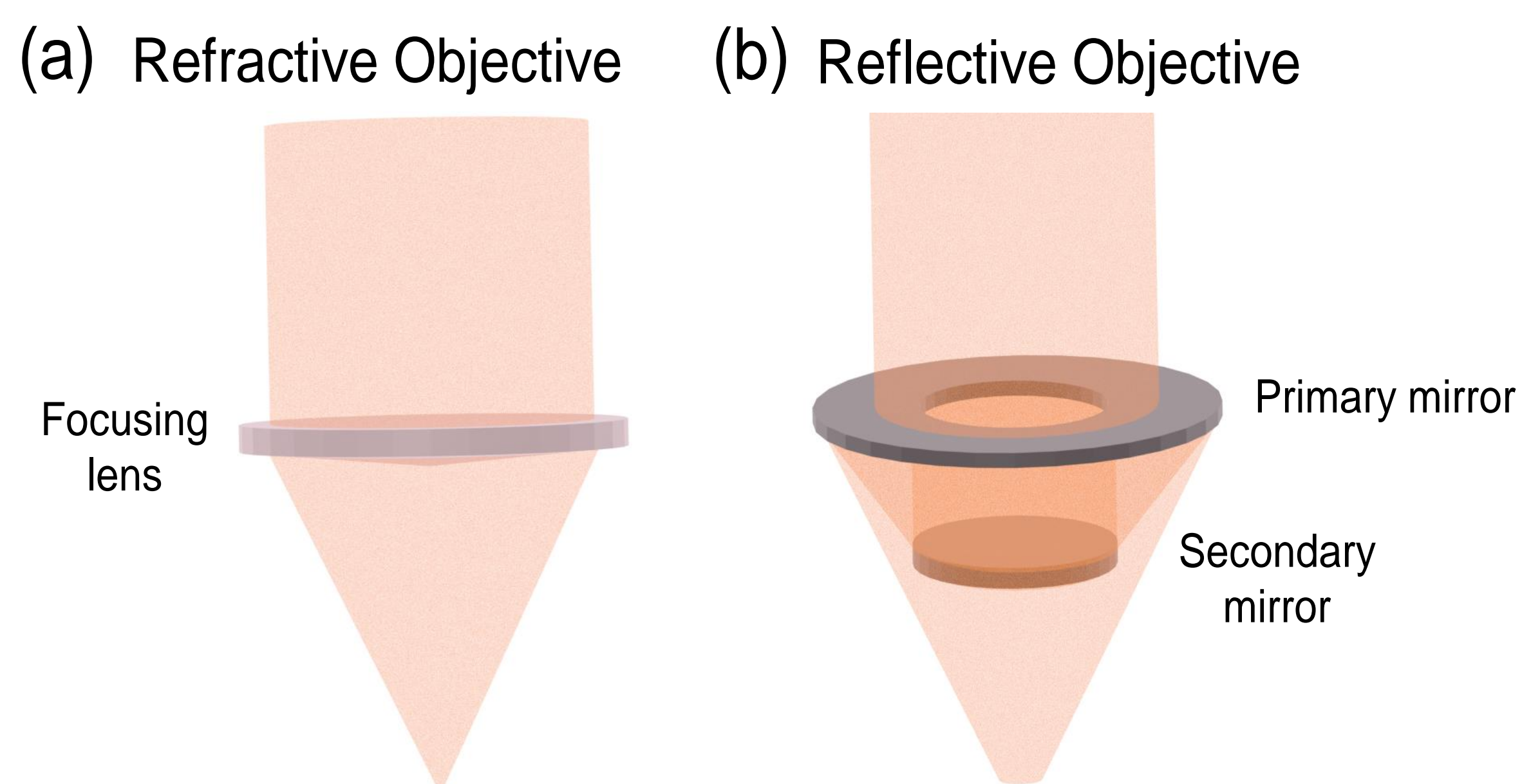
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Abstract

- Cassegrain-type reflective objectives :: high-resolution infrared optical micro-spectroscopy experiments
- Aberration-free optics
- Central obscuration :: positioning of the secondary mirror with respect to the primary mirror
- Effect of obscuration :: linear and non-linear response

- Our work
 - Modelling optical responses due to reflective objective
 - COMSOL Multiphysics's wave optics module
 - Model and simulate the linear and non-linear optical responses
 - Amorphous-germanium (a-Ge) on quartz-based metasurface

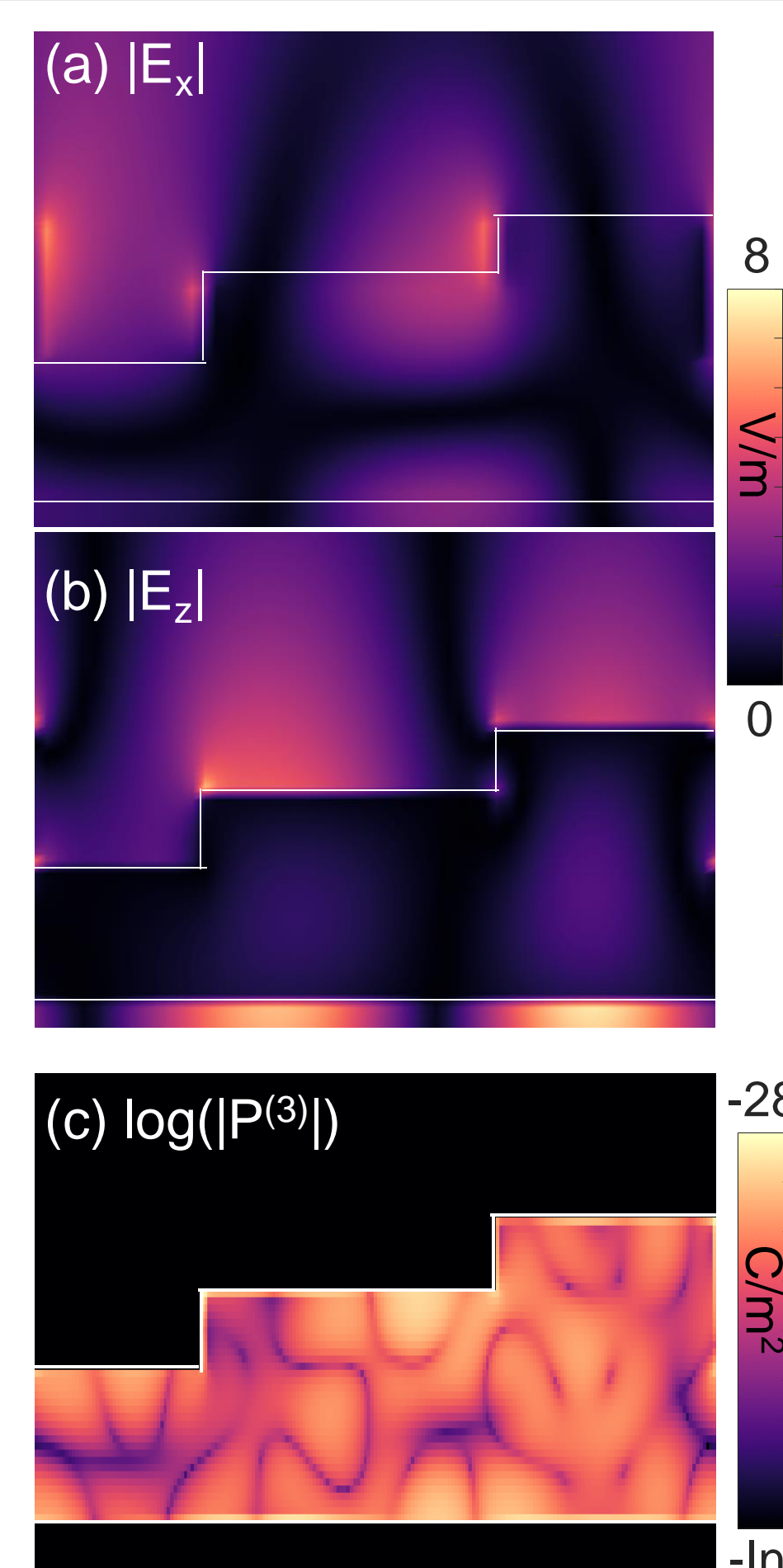
Plane wave expansion model



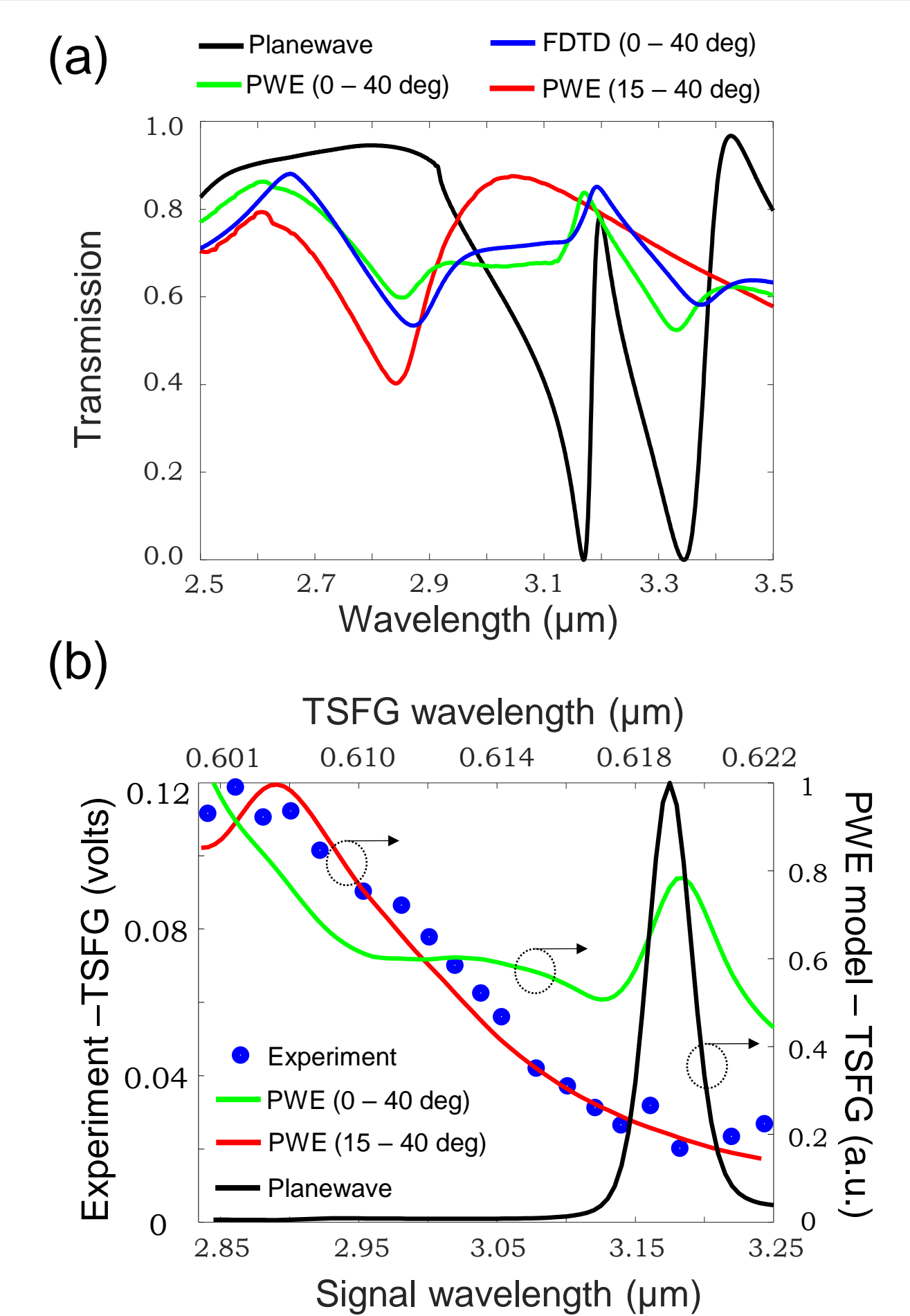
Results

- Validation of the model :: comparing the responses of reflective objective and a conventional refractive objective
- Linear :: Transmission spectra, Non-linear :: Third-order sum frequency generation (TSFG) spectra
- Good agreement in experimental and model results
- Model arbitrary source excitation, Less memory requirement and computational cost.

Electric fields and non-linear polarization



Validation of model



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