


### Collaborators in this topic:

dr. S. O. Dabironezare, dr. G. Carluccio, H. Zhang, Prof. A. Freni, Prof. . Neto, Prof N. Llobmart

During this ERC, we have developed a theoretical framework based on Coherent Fourier Optics (CFO) theory for deriving the Plane Wave Spectrum in Quasi-Optical (QO) Systems. This theory is based on an analysis in reception combined with an asymptotic evaluation of a Physical Optics integral coupled to a field propagation using Geometrical Optics. This technique is extremely powerful for the optimization of these systems using field-match techniques as well for modelling periodic structures inside QO systems.

If you are interested in this topic, you can find detailed information in the PhD thesis of S.O. Dabironezare:

Fourier Optics Field Representations for the Design of Wide Field-of-View Imagers at Sub-millimeter Wavelengths



S.O. Dabironezare  
Promoters: Prof. Nuria Llobmart and Prof. Andrea Neto

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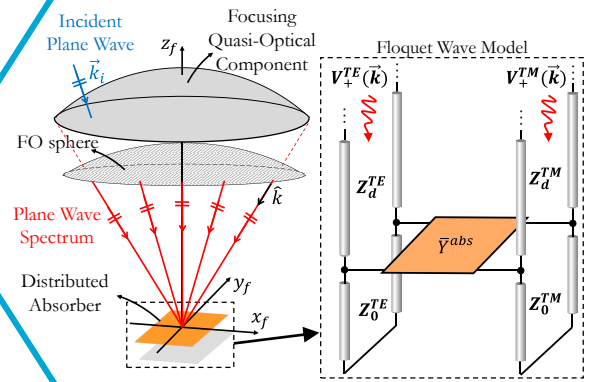
### Fourier Optics Model

**Output:** Modeling of antennas and absorber based detectors below focusing Quasi-Optical systems.

**Application:** Deriving fundamental sensitivity & resolution trade-offs between incoherent and coherent imaging arrays.

N. Llobmart, et al., "Reception Power Pattern of Distributed Absorbers in Focal Plane Arrays: a Fourier Optics Analysis," IEEE Transactions on Antennas and Propagation, Nov. 2018.

S. O. Dabironezare, et al., "A Dual-Band Focal Plane Array of Kinetic Inductance Bolometers Based on Frequency-Selective Absorbers," IEEE Transactions on Terahertz Science and Technology, Nov. 2018.

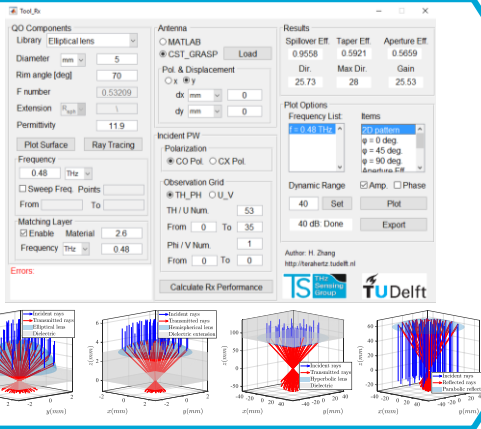


### Graphic User Interface

**Output:** A freely available MATLAB software based on field-matching techniques combined with Fourier Optics analysis. Includes a set of key canonical Quasi-Optical components and wide angles of incidence.

**Application:** Designing advanced Quasi-Optical antenna feeds.

H. Zhang, S.O. Dabironezare, G. Carluccio, A. Neto, N. Llobmart, "A Fourier Optics Tool to Derive The Plane Wave Spectrum of Quasi Optical Systems," IEEE Antenna and Propagation Magazine, Feb. 2021.



### Fourier Optics for Multi-Cascade Quasi-Optics

**Output:** An extension on Fourier Optics theory for multi-cascade Quasi-Optical components such as Fly's eye Focal Plane Arrays.

**Application:** Synthesizing coherent imaging arrays with unprecedented field of views without the need for iterative optimization techniques.

S. O. Dabironezare, G. Carluccio, A. Freni, A. Neto, and N. Llobmart, "Coherent Fourier Optics Model for the Synthesis of Large Format Lens Based Focal Plane Arrays," IEEE Transactions on Antennas and Propagation, Feb. 2021.

