



## OPTICAL ELEMENTS

# Arbitrary 3D lattices of Bessel beams for industrial applications

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## What we are looking for

We are looking for a suitable partner to enter into license / co-development agreement.

## What it is needed for?

Bessel Beams (BB) and BB lattices (BBL) represent a key enabling technology in photonics, microscopy, material processing, lithography and nanofabrication, as they enable generation of extended focal depth, self-healing and less prone to diffraction beams compared traditional approaches such as Gaussian beams.

Currently, such features are achieved by bulky and complex, tailor-made for-the-intended-application optical systems that lack flexibility, have limited resolution and diffraction efficiency, and are challenging to design and manufacture, not to mention costly.

To tackle such challenges, we are proposing a novel method to encode in a single flat element all the optical operations required to generate a 1D/2D/3D BBL, including those of the excitation objective.

We have fabricated such optical element using Meta-Surface (MS) technology and, for a *proof-of concept*, tested it in Light sheet microscopy to record neuronal activity *in vivo* in the zebrafish larval brain.

## Advantages

- Independent control of the spatial position and extension of BB profile, and beam multiplexing;
- Flexibility in shaping BBL based of specific needs.
- Compact - Single element that incorporates a whole optical path;
- Compatible with standard microfabrication processes (e.g., CMOS technology); Mass production at lower than the market average cost enabled.

## Applications

Optical elements for microscopy, photonics, communication, material processing, lithography and nanofabrication.

## TRL scale

