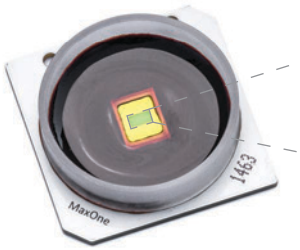
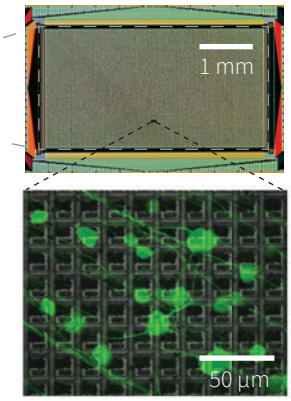
maxwell BIOSYSTEMS

Every Cell Counts.

MaxOne for Retinal Studies





MaxOne, a high-density microelectrode array (HD-MEA) system, is best suited for vision research.

Combining MaxOne with a light stimulation set-up allows every scientist to access and investigate retinal ganglion cell function *ex vivo*.

High-resolution enables recording of every retinal ganglion cell

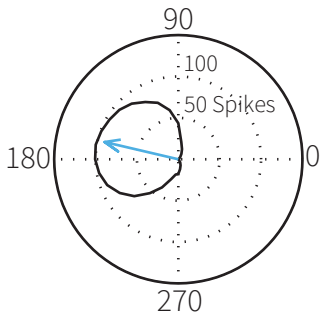
- 26,400 electrodes
- 8 mm² sensor area
- 3,265 els. per mm²
- Low noise (2.4 μV_{rms})
- 20 kHz sampling rate
- Up to 78 dB amp. gain

Identify the Function of Retinal Ganglion Cells (RGCs)

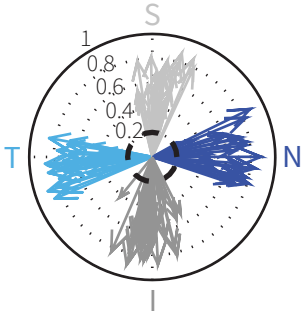
Raster plot
ON-OFF RGCs

Flashing static stimuli

Preferred direction of ganglion cells



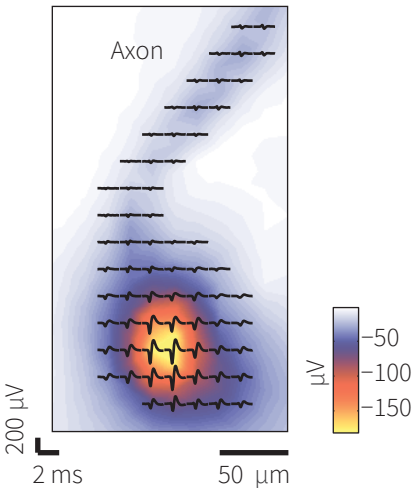
Tuning curve of one RGC



Preferred direction of 126 RGCs

T: Temporal S: Superior
N: Nasal I: Inferior

Action potential map of one RGC



Record and identify every retinal ganglion cell type on the MEA.

The light response of every retinal ganglion cell (RGC) on the MEA can be recorded and analyzed using MaxOne.

- MaxOne's signal-to-noise ratio + high spatio-temporal resolution allow the analysis of RGC axonal signals.
- Flashing static light reveals different RGC firing properties: ON type, OFF type, or ON-OFF type.
- Direction-selective RGC responses can be extracted using moving stimuli.

MaxOne

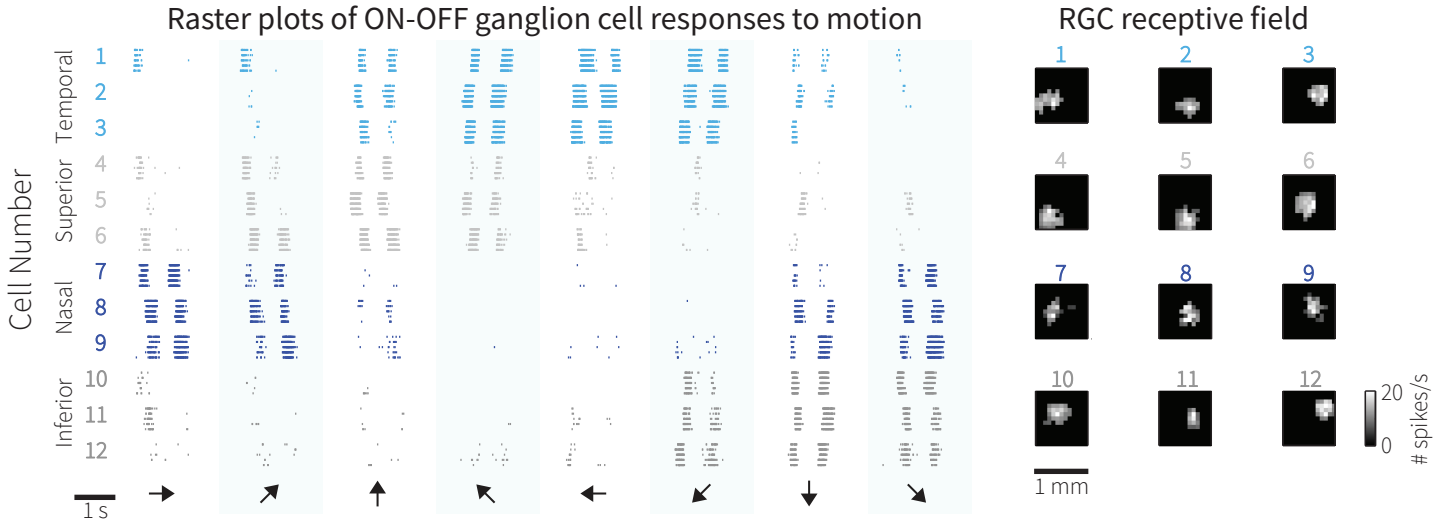
High-Density Microelectrode Array Platform

Reveal Defined Receptive Field Mosaics of RGCs

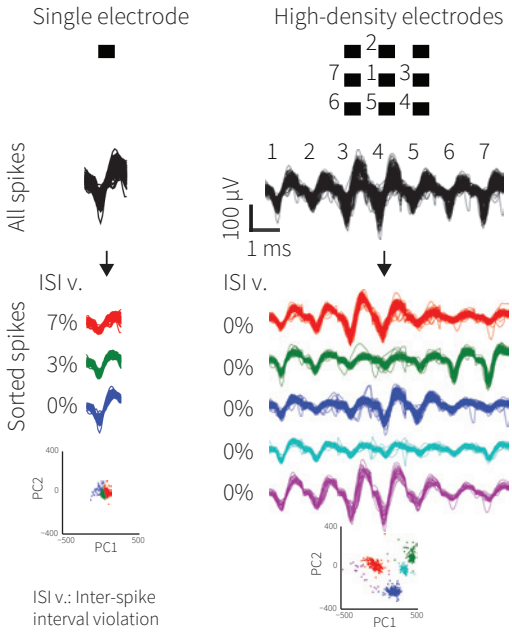
Extract and analyze receptive field mosaics of retinal ganglion cells at unprecedented resolution.

MaxOne records multiple RGCs simultaneously and captures visual receptive field mosaics activated by moving bar stimulation.

- Firing responses of ON-OFF direction-selective RGCs reveal their preferred direction.
- Highly resolved receptive field mosaics show little overlap between RGCs of the same type.



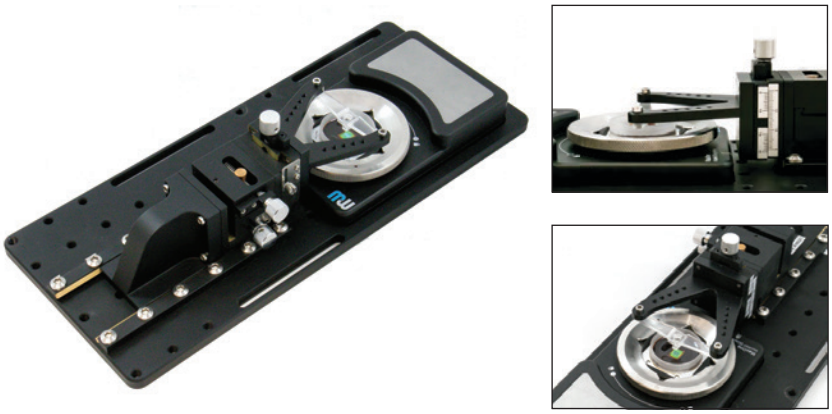
Spike Sorting



MaxOne's high spatial resolution facilitates reliable spike sorting.

Multiple electrodes detect spikes from an RGC. The additional spatial information improves the accuracy of spike clustering.

Retina Holder



MaxOne Tissue Holder flattens the retina on the MEA for repeatable and stable experiments.

The tissue holder keeps the retina pressed and fixed on the MEA throughout the experiment, in the presence of solution perfusion.

- 3-axis manipulator allows precise control of the holder.
- A membrane or a fine mesh can be used.
- A magnetic plate serves as a stand for the perfusion tubes.

References:
M. Fiscella et al., J. Neurophysiol., 114:4, 2015. M. Fiscella et al., J. Neurosci. Methods, 211:1, 2012.

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