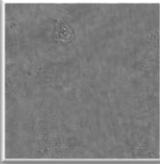


### Why QPI?

In traditional **label free** imaging cells appear transparent



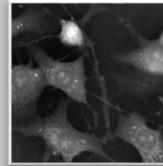
Brightfield image of cells

The **low contrast** images makes any **complex analysis** of the cells very challenging

Boosting contrast by introducing fluorescence labels is not ideal for live cells

QPI techniques produce **inherently high contrast** images by examining how the sample affects the **phase** of the illumination light

Detectors **cannot** directly measure phase information



QPI image of cells

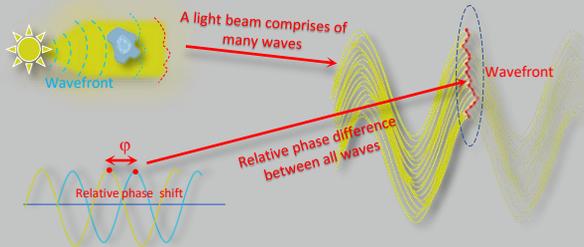
QPI techniques use an **indirect** measurement of phase

This enables QPI to produce **high-contrast information-rich** images

Livecyte employs a QPI technique called **ptychography**

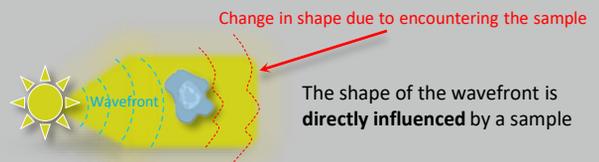
### What is a wavefront?

The **wavefront** shape depends on the **phase**



A wavefront of a light beam is defined by the **relative phase shift ( $\phi$ )** of the waves that comprise that beam

QPI detects the **shape of the wavefront** and recovers information regarding the sample

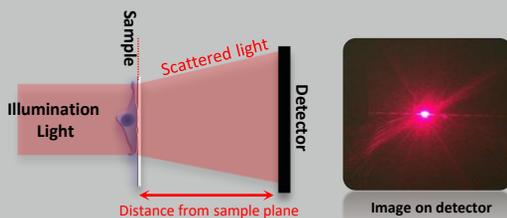


Detectors are only **sensitive** to **intensity** information

To calculate the relative phase shifts we use the **intensity** information contained in **diffraction patterns**

### Collection of information

A **diffraction pattern** is an image formed on the detector by the light as it passes through the sample



These patterns contain information which can be used to retrieve the **relative phase shift** and subsequently the **wavefront**

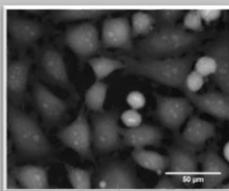
Livecyte scans over the area of interest and collects a number of **overlapping diffraction patterns** – generating **more information** about the sample



The more information we have the better we can create an accurate image of the sample

### QPI Images

QPI represents the phase information as **high contrast information-rich** images!



QPI utilises the **natural contrast** contained in the phase of the light

The key is gaining access to that **Phase** information

High contrast images enables **complex and robust** downstream **analysis** of the images

### Benefits of QPI to live cell imaging

<b>Label-free</b> <b>Low illumination</b> power	Minimal perturbation to Live cells
<b>High contrast</b> images <b>Quantitative</b> information	Enables complex analysis
<b>Post-acquisition</b> refocussing	Unaffected by focal drift over long-term time-lapse imaging