

## // LOCALIZATION LIGHT EMITTING MOLECULES OF UNKNOWN ORIENTATION

Ref-Nr: TA-P-899

### HINTERGRUND

Many light emitting entities routinely used, in cell biological settings show a dipole orientation. If the exact z position of the light emitting entity is unknown, using simple two-dimensional Gaussian fit algorithms to the light intensity distribution of a range of emitted light, may lead to calculation errors of the x- and y-position of several 10nm. The invention discloses a method for calculation of the exact spatial position and orientation of a light emitting in a sample.

The method has been verified experimentally as well as theoretically (see reference below).

### LÖSUNG

First the virtual x- and y-positions and of a light emitting entity are determined for several plans parallel to the focus plan. Thereafter the absolute and/or relative total or peak emitted light intensities in the images of the marker entity are accounted for in determining the z-position and spatial orientation of the marker (see figure).

**dkfz.** DEUTSCHES  
KREBSFORSCHUNGSZENTRUM  
IN DER HELMHOLTZ-GEMEINSCHAFT

Deutsches  
Krebsforschungszentrum DKFZ

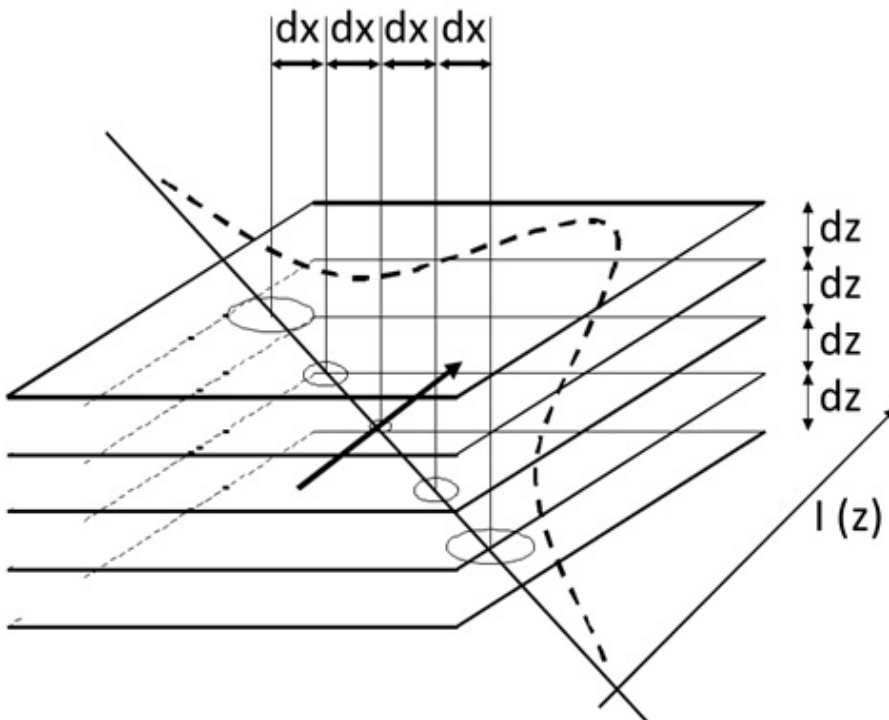
Dr. Frieder Kern  
+49-6221-42-2952  
f.kern@dkfz.de  
www.dkfz.de

### ENTWICKLUNGSSTAND

Prototyp

### CATEGORIES

//Medizinische  
Geräte //Medizintechnik



The figure shows the peak emitted light intensity  $I(z)$  and the relative x- and y-position of a dipole in images depending on the z-position of the focal plane. The exact spatial orientation of the light emitting entity can be calculated using all these information.

## VORTEILE

- Fluorescence super-resolution
- Single molecule localization accuracy

## ANWENDUNGSBEREICHE

DKFZ is looking for a licensee for further development and commercialisation this technology for samples in high resolution microscopes particularly FPALM, PALM, STORM and PALMIRA.

## PUBLIKATIONEN & VERWEISE

"Molecular orientation affects localization accuracy in super-resolution far-field fluorescence microscopy." by Johann Engelhardt et al. in Nano Lett. 2011 Jan 12;11(1):209-13.

