

# WORCESTER POLYTECHNIC INSTITUTE MECHANICAL ENGINEERING DEPARTMENT

Optical Metrology and NDT  
ME-593L, B'2011

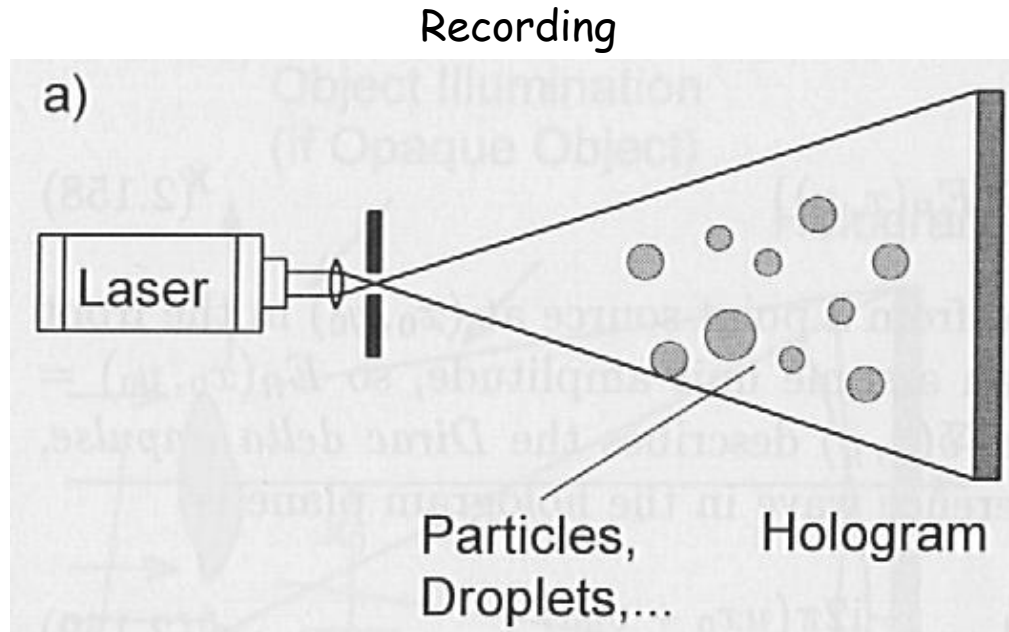
Introduction: Types of Holograms  
14 November 2011



# Types of holograms

## In-line holography -- Gabor 1948

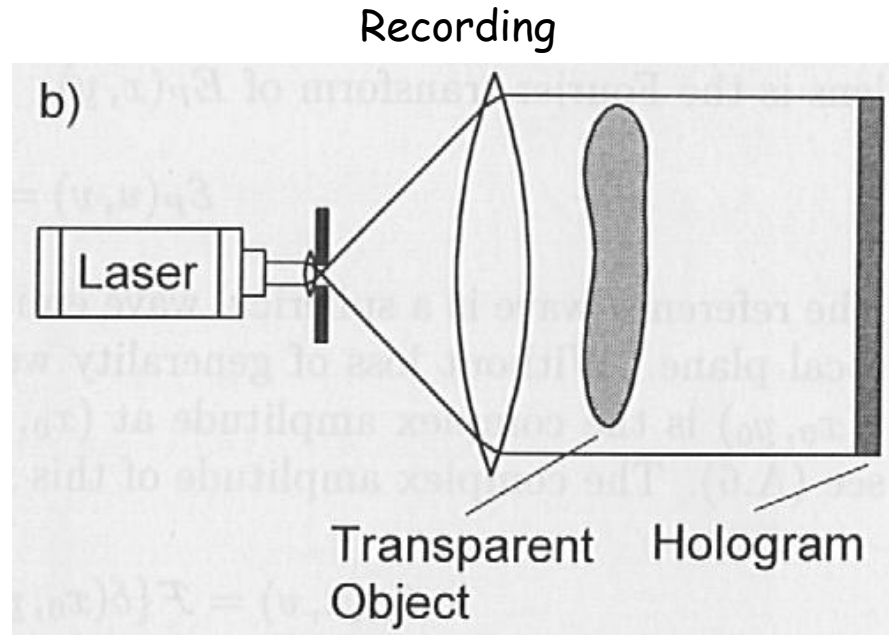
- In-line holography with divergent illumination



# Types of holograms

In-line holography -- Gabor 1948

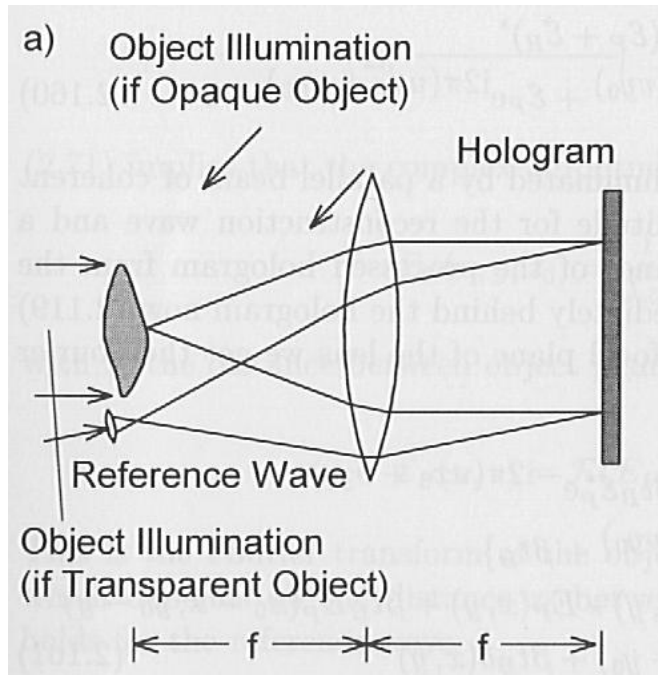
- In-line holography with collimated illumination



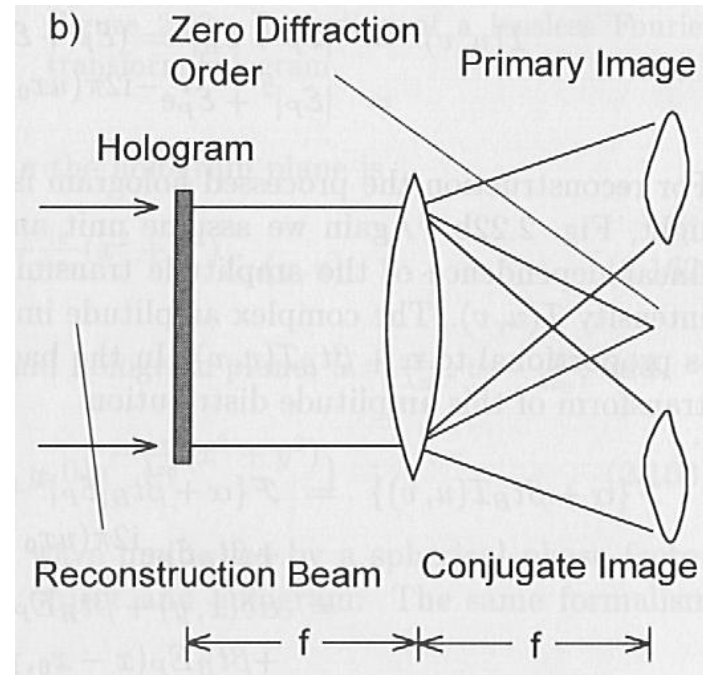
# Types of holograms

## Fourier transform holograms

### Recording



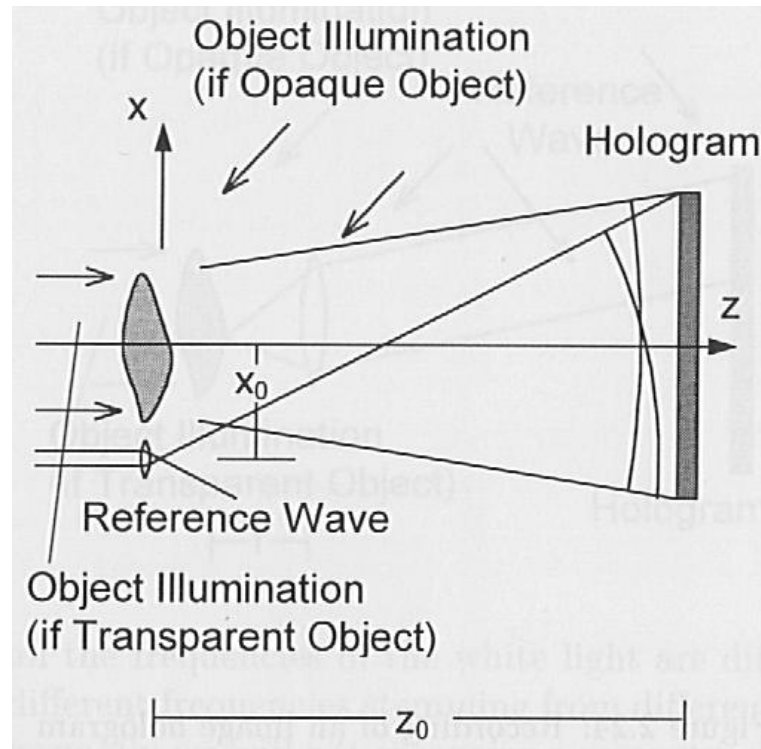
### Reconstruction



# Types of holograms

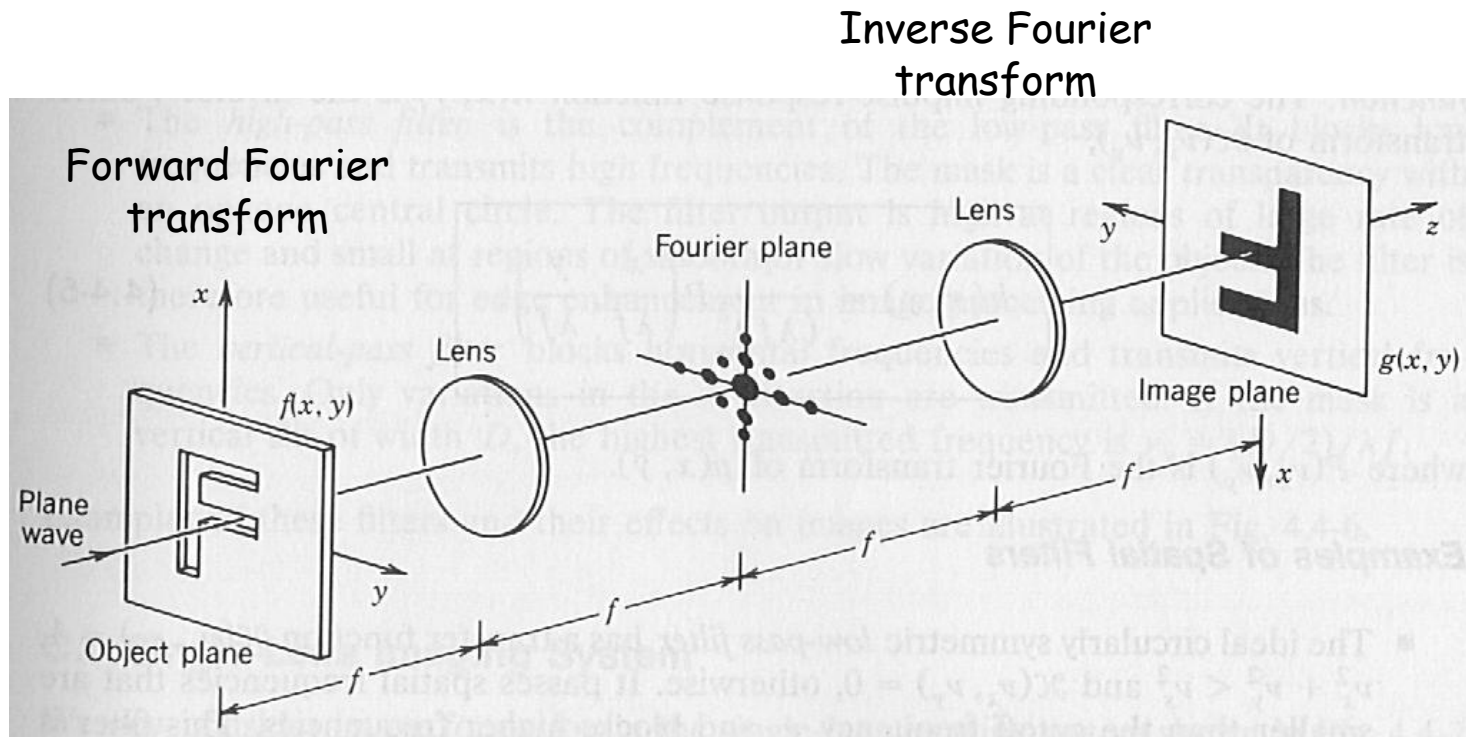
## Fourier transform holograms: lensless

### Recording



# Optical Fourier transform

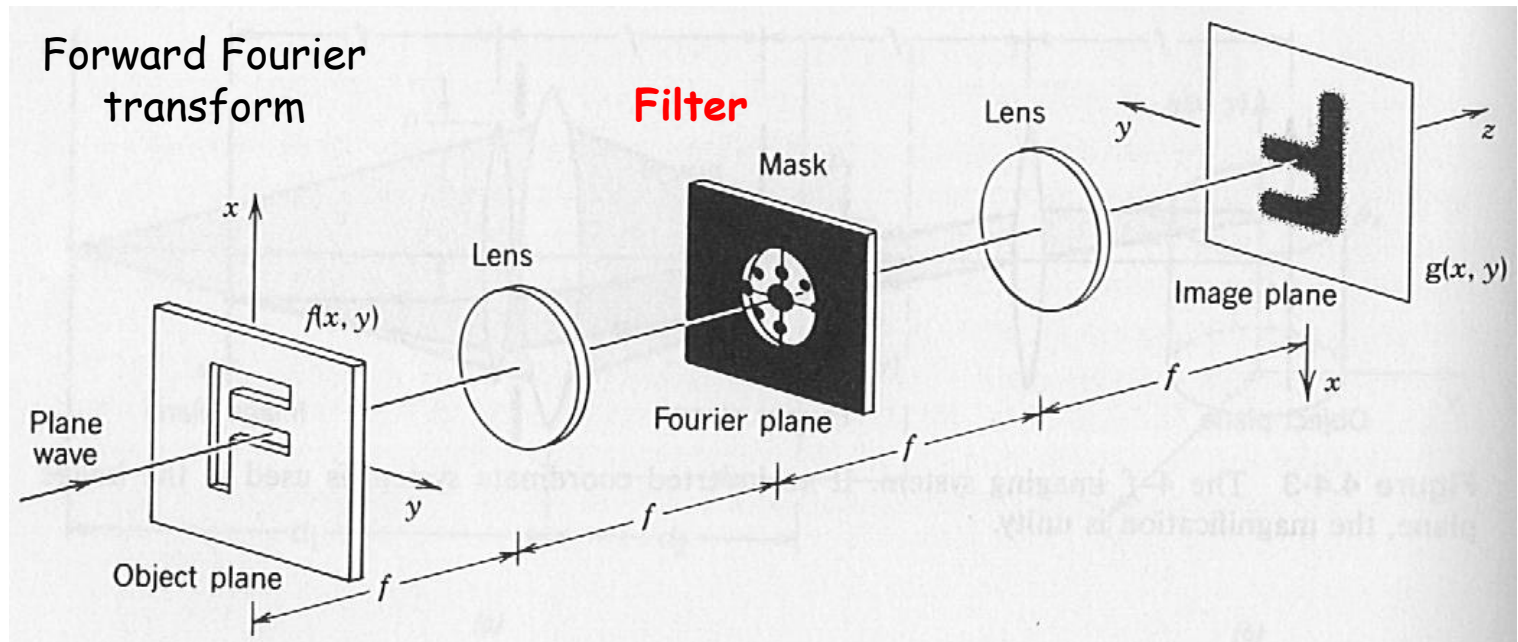
## Forward and inverse 4- $f$ system



# Optical Fourier transform

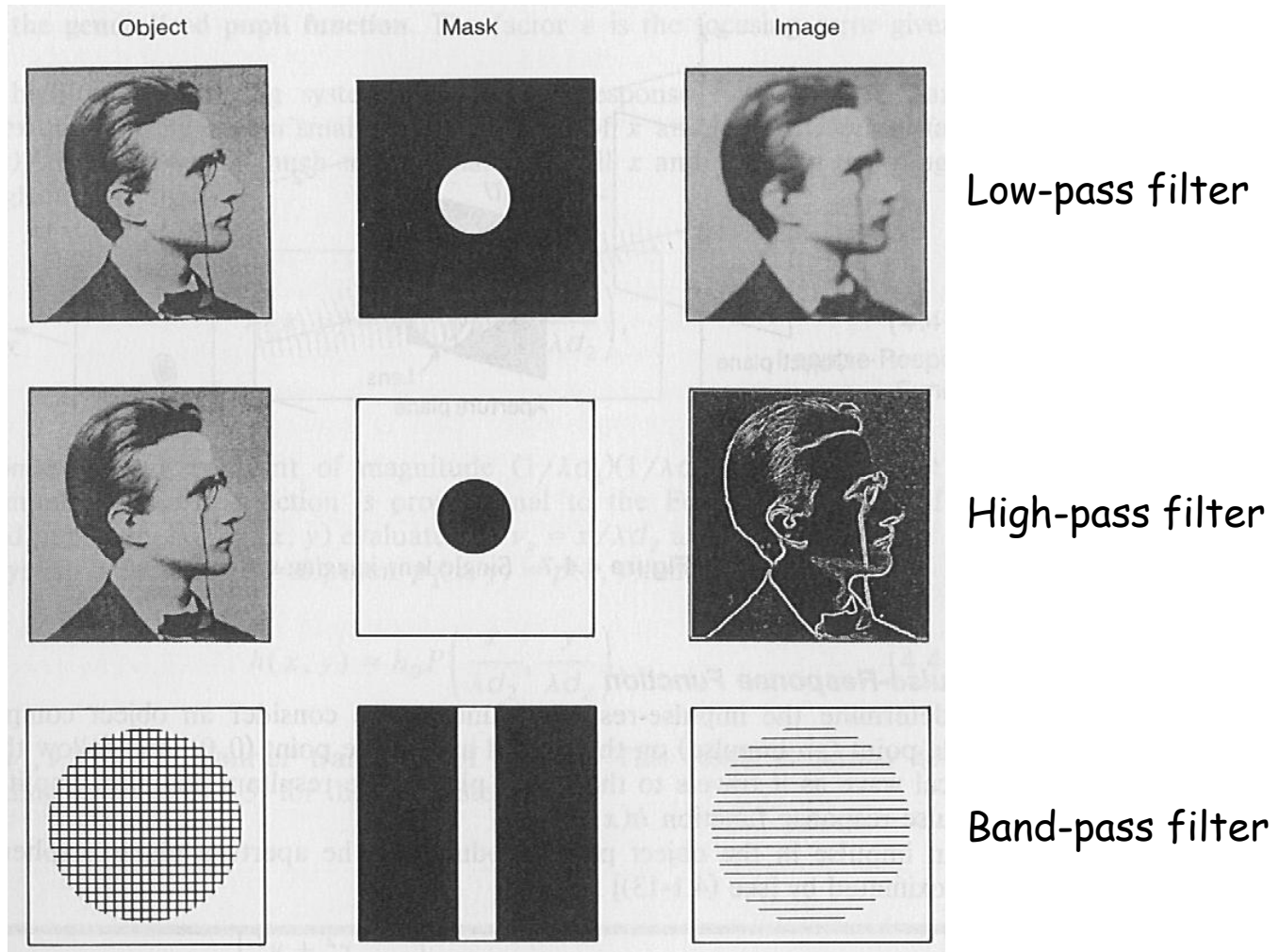
Forward and inverse  $4-f$  system: filtering

Inverse Fourier transform



# Optical Fourier transform

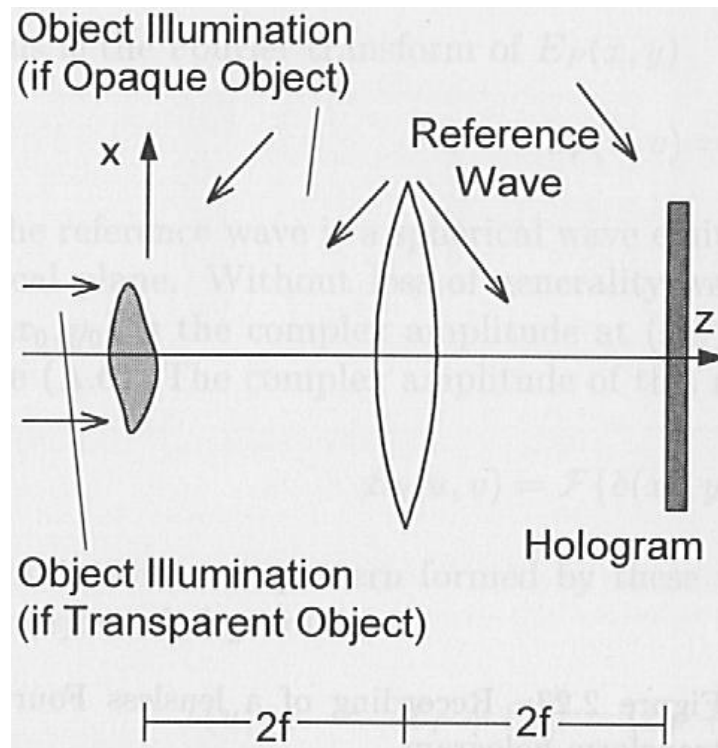
## Filtering: effects of masking



# Types of holograms

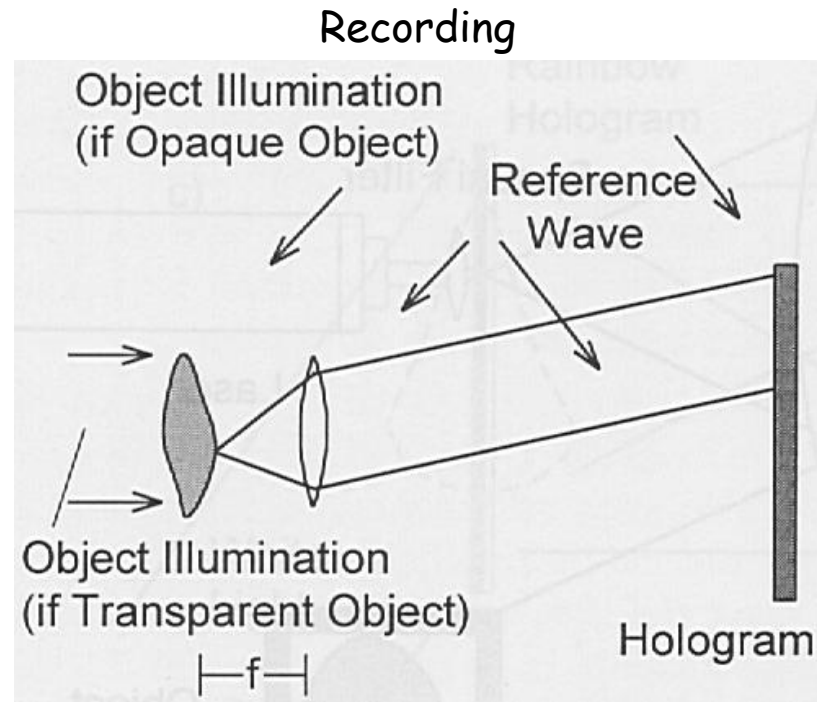
## Image hologram

### Recording



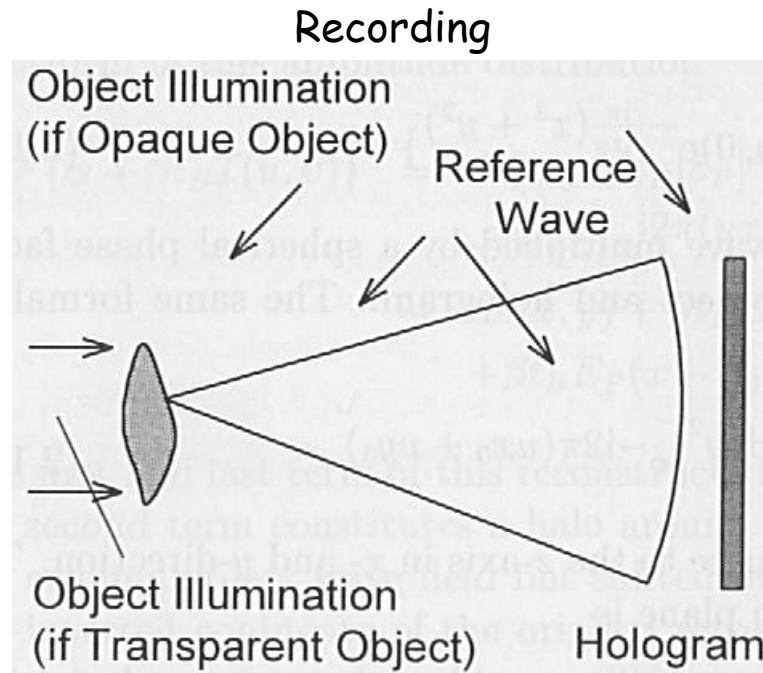
# Types of holograms

## Fraunhofer hologram



# Types of holograms

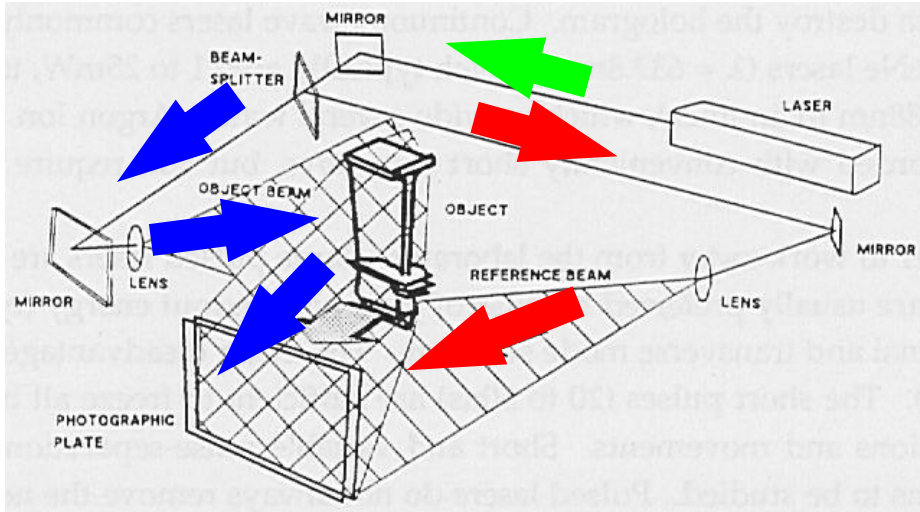
## Frenel hologram



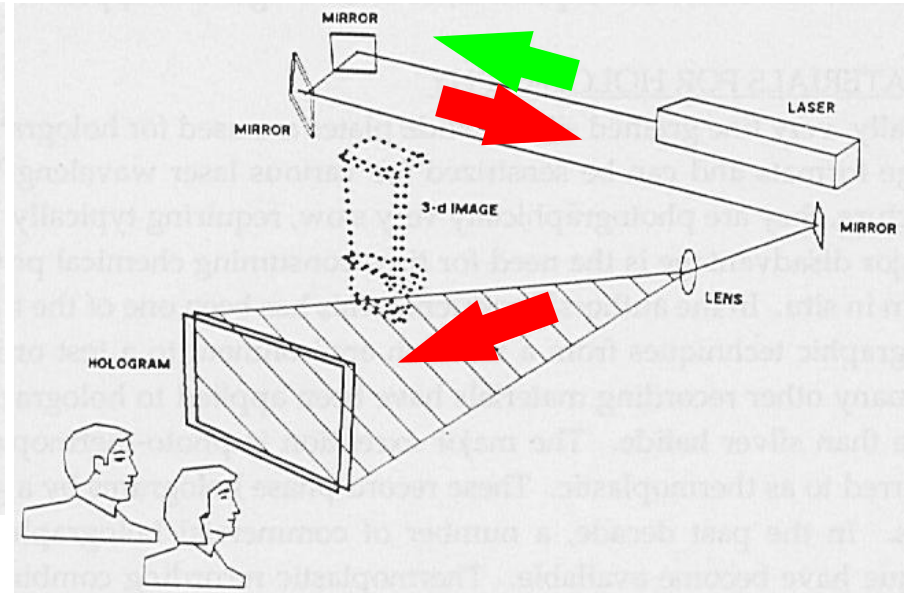
# Types of holograms

## Frenel hologram

### Recording



### Reconstruction



# Recording and reconstruction

- Speckles
- Recording and reconstruction holograms
- Lab tour and properties of holograms

