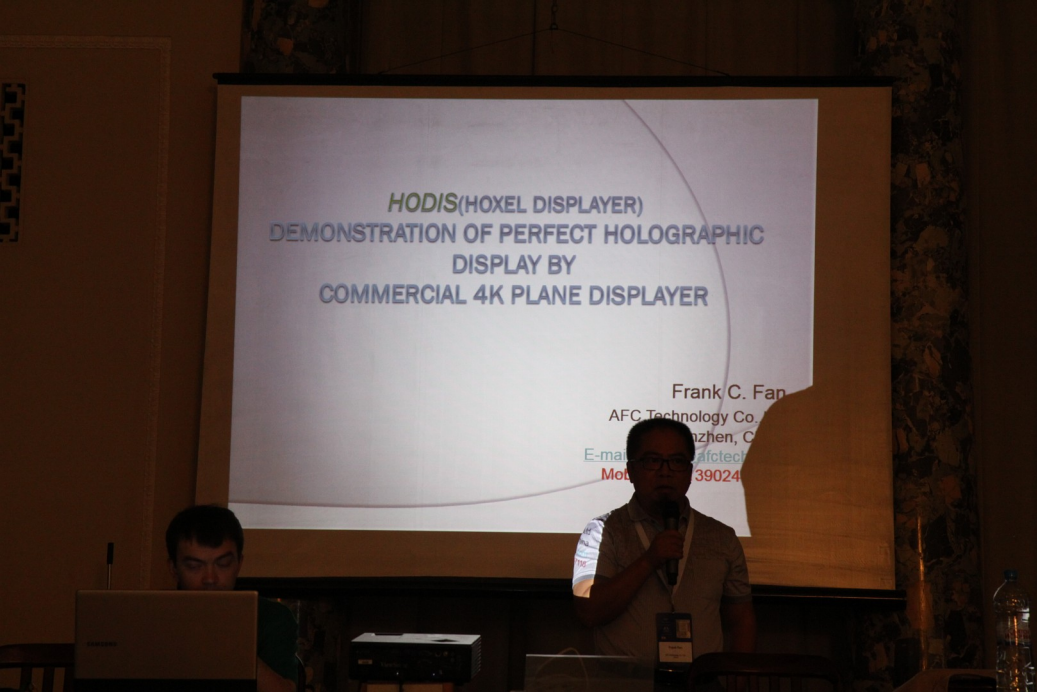
HODIS(HOXEL DISPLAYER)
DEMONSTRATION OF PERFECT HOLOGRAPHIC DISPLAY BY
COMMERCIAL 4K PLANE DISPLAYER
Frank C. Fan
AFC Technology Co.
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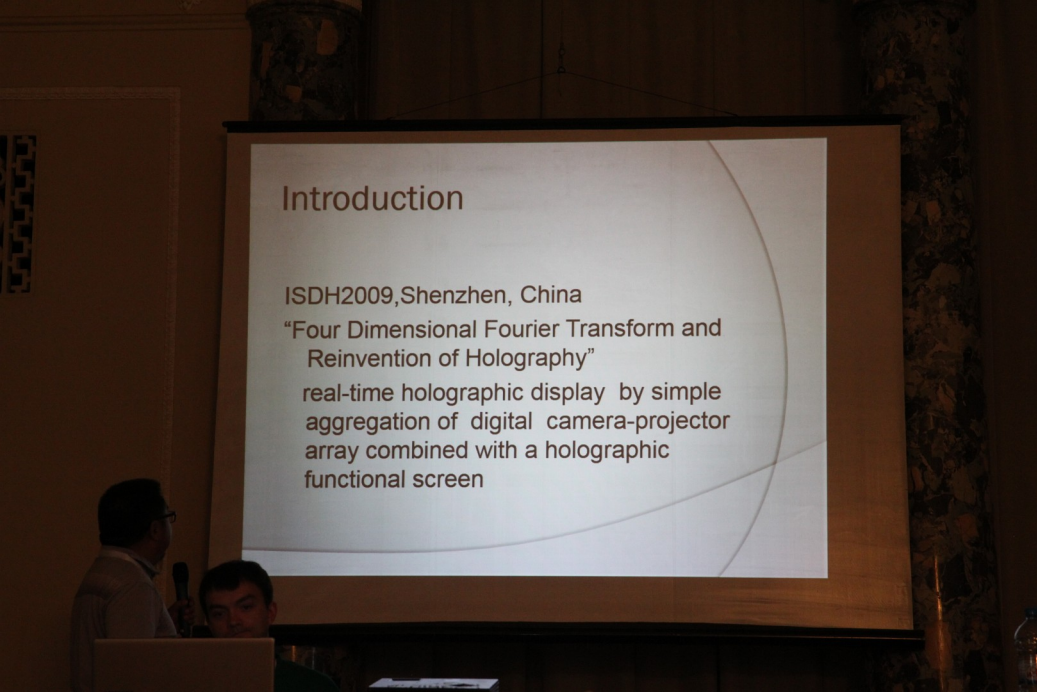
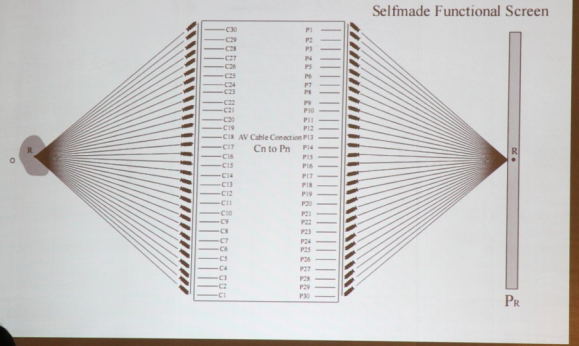
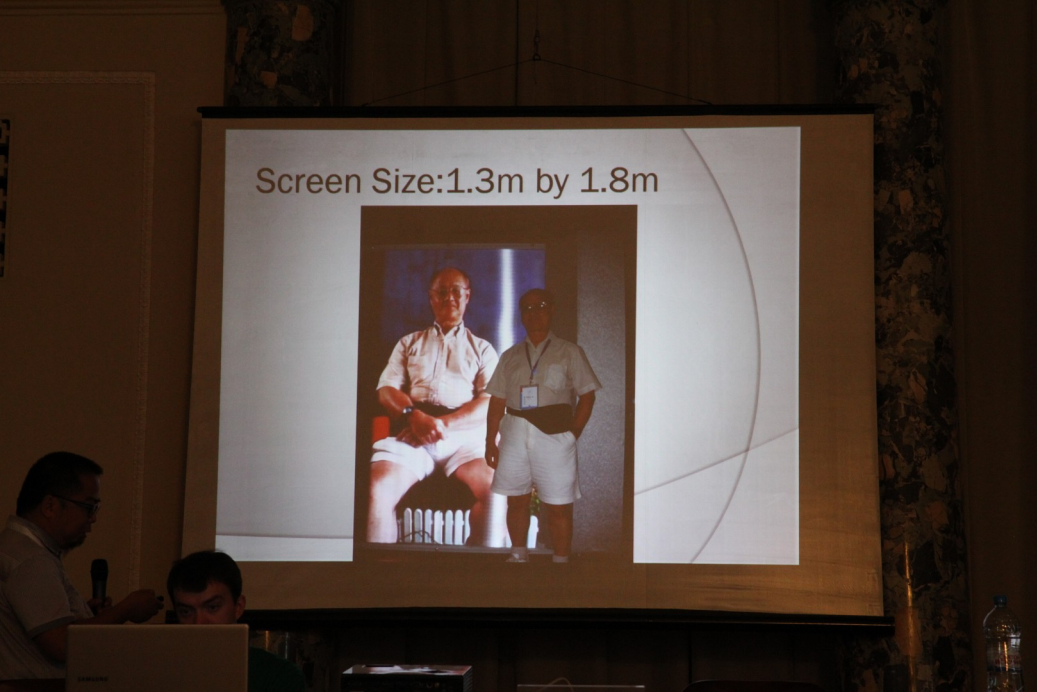
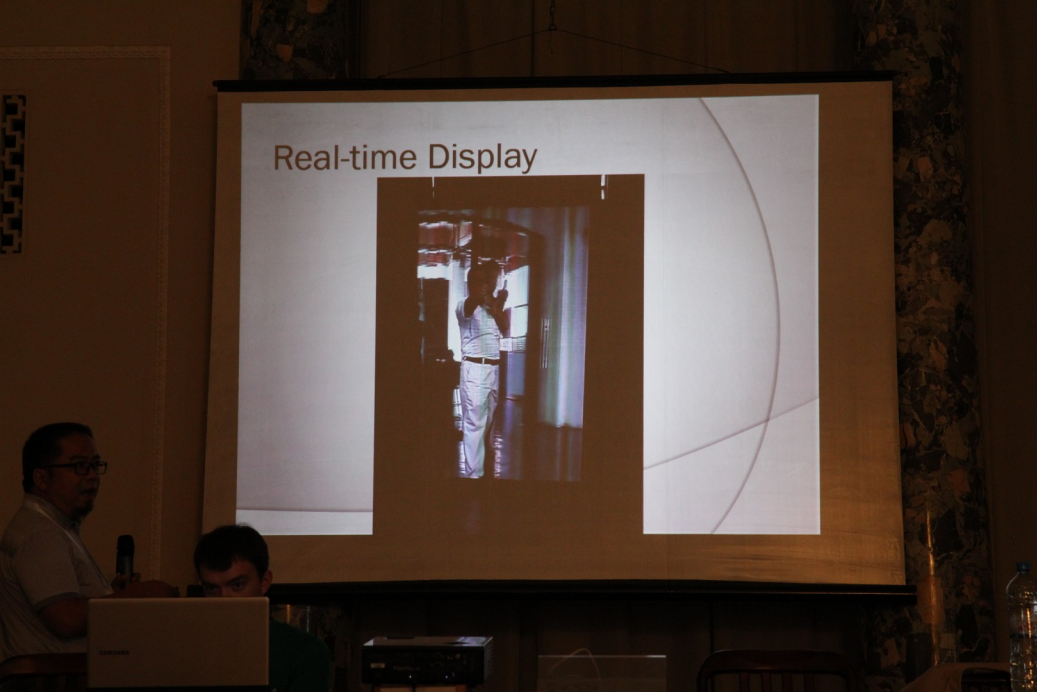
39024


Introduction
ISDH2009,Shenzhen, China
“Four Dimensional Fourier Transform and Reinvention of Holography”
real-time holographic display by simple aggregation of digital camera-projector array combined with a holographic functional screen

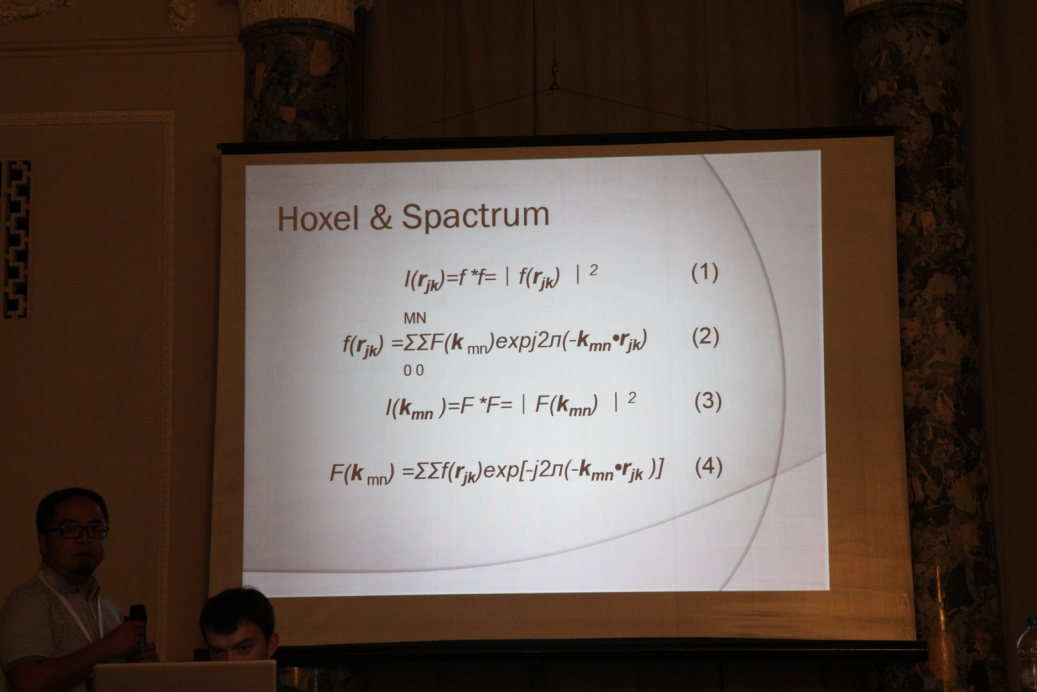
Real-time Display System



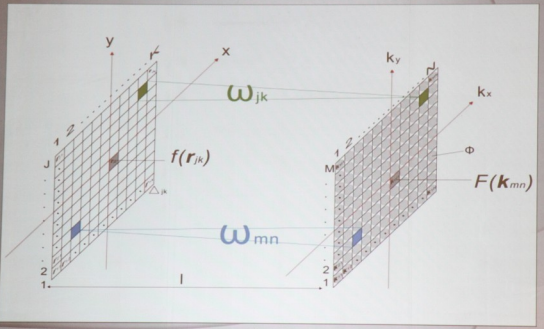

Screen Size:1.3m by 1.8m

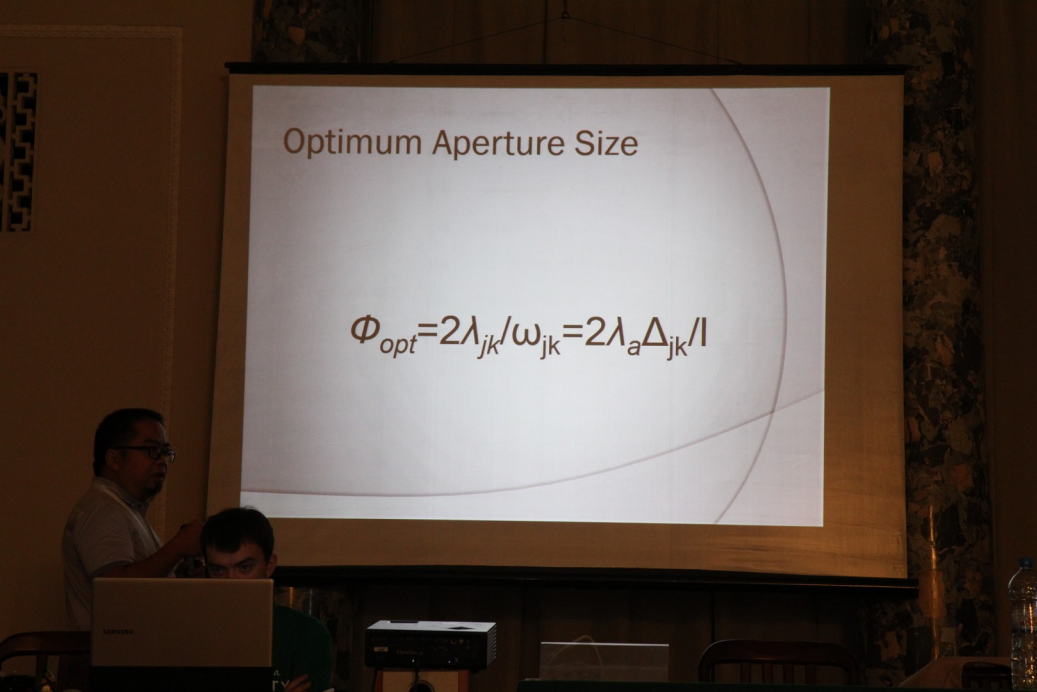

Real-time Display


Video for Digital Files by Geola

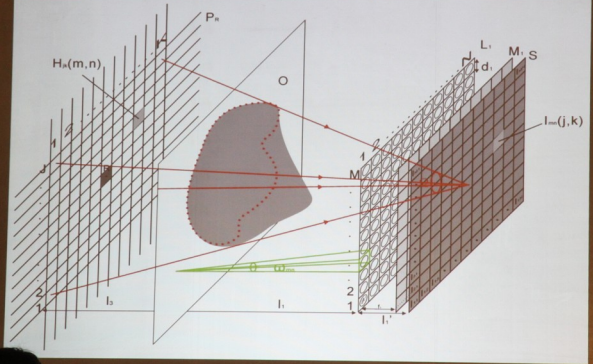

Hoxel & Spactrum
$I(\mathbf{r}_{jk})=f*f=|f(\mathbf{r}_{jk})|^2$ (1)
$f(\mathbf{r}_{jk})=\sum_{0}^{M}\sum_{0}^{N}F(\mathbf{k}_{mn})exp j2\pi(-\mathbf{k}_{mn}\bullet\mathbf{r}_{jk})$ (2)
$I(\mathbf{k}_{mn})=F*F=|F(\mathbf{k}_{mn})|^2$ (3)
$F(\mathbf{k}_{mn})=\sum\sum f(\mathbf{r}_{jk})exp[-j2\pi(-\mathbf{k}_{mn}\bullet\mathbf{r}_{jk})]$ (4)

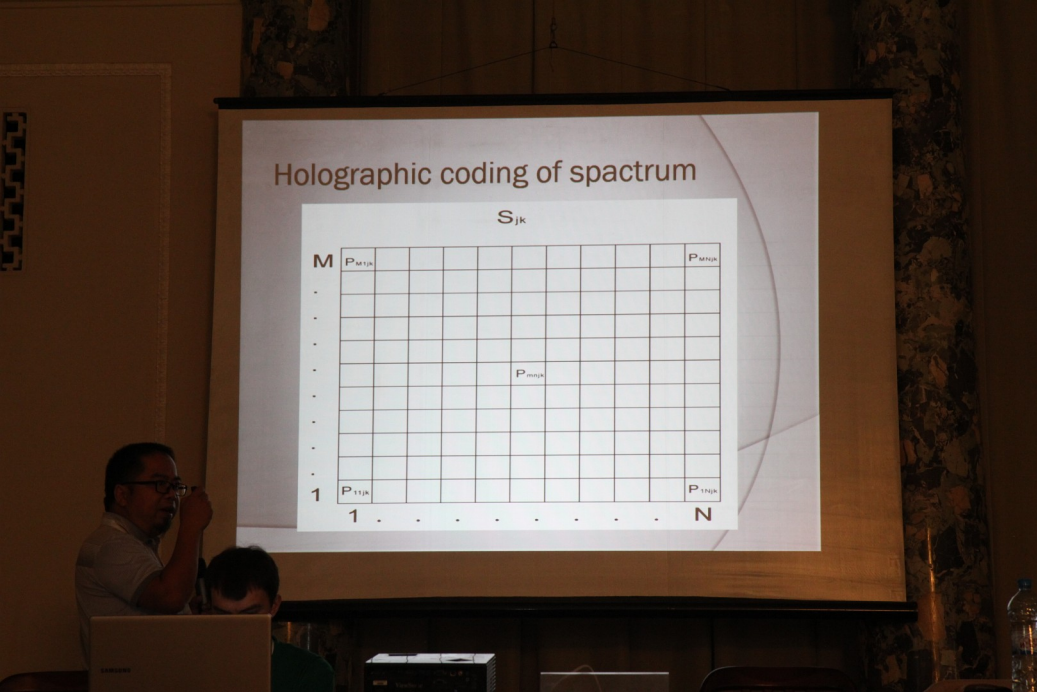
Holographic Sampling & Display



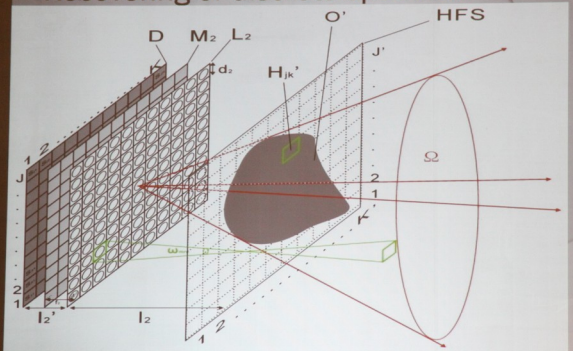

Optimum Aperture Size
$\Phi_{opt}=2\lambda_{jk}/\omega_{jk}=2\lambda_a\Delta_{jk}/l$

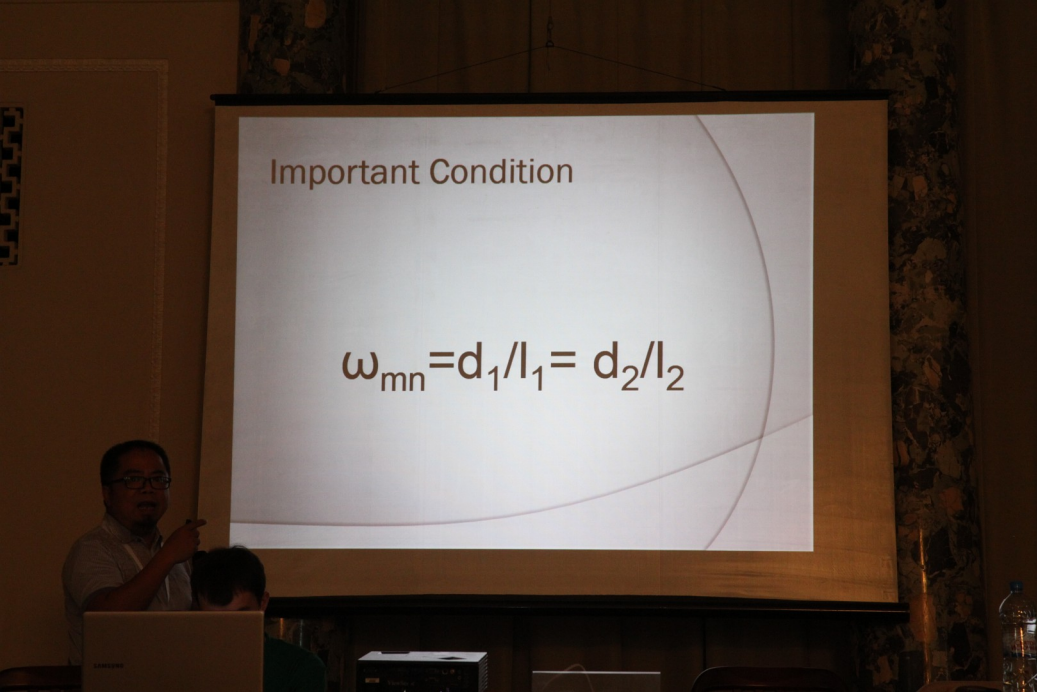
Parallel acquisition of spactrum

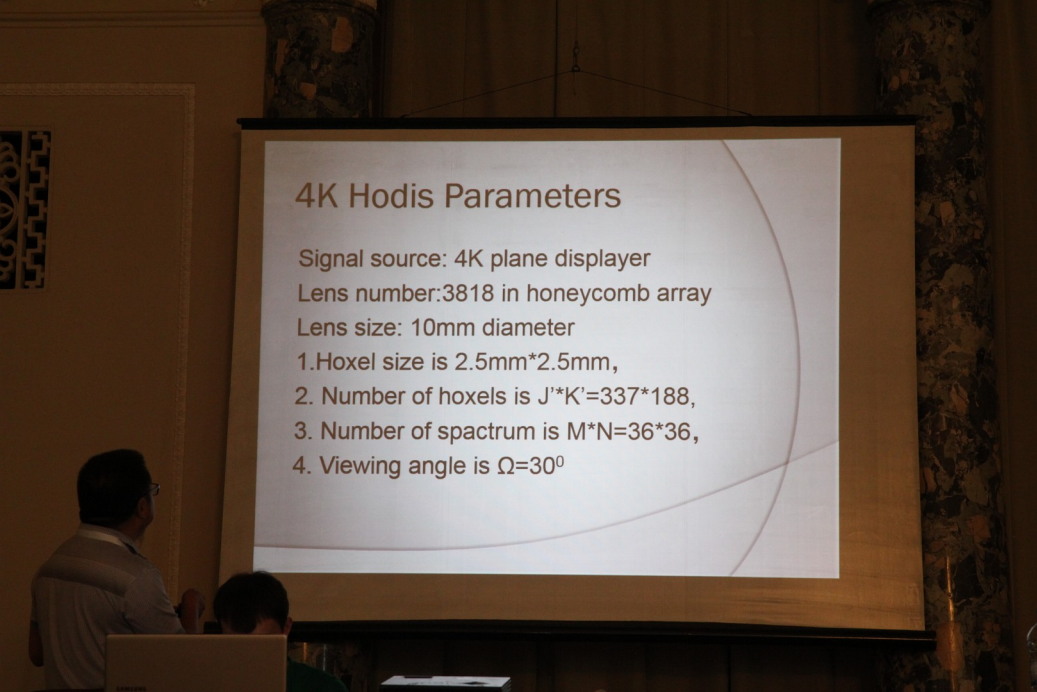



Holographic coding of spactrum
Sjk
M
1
1
N
PM1jk
PMNjk
Pmnjk
P11jk
P1Njk

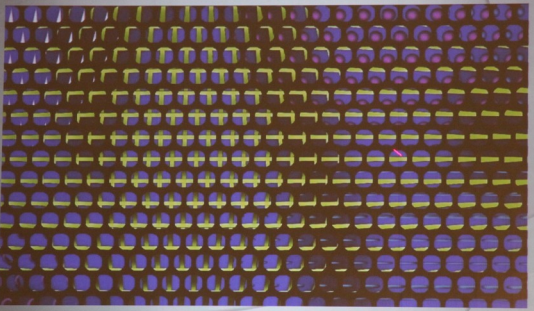
Recovering of discrete spactrum

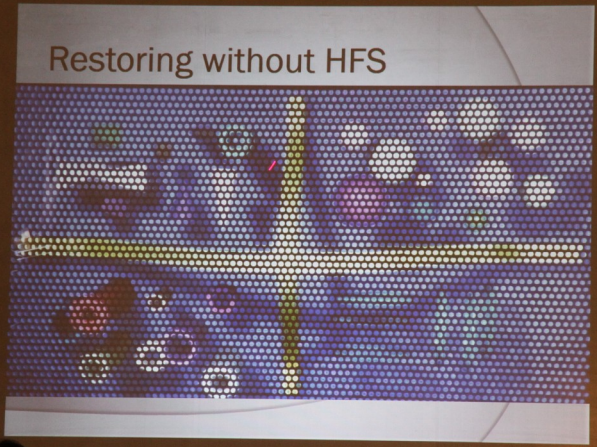


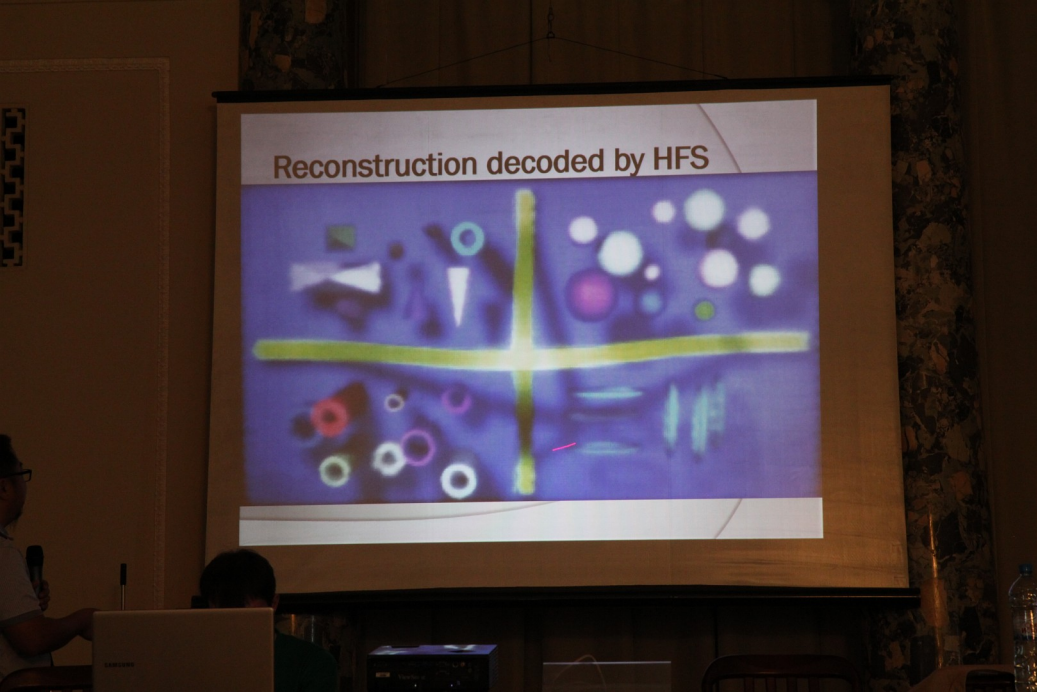

Important Condition
$\omega_{mn}=d_1/l_1= d_2/l_2$


4K Hodis Parameters
Signal source: 4K plane displayer
Lens number:3818 in honeycomb array
Lens size: 10mm diameter
1.Hoxel size is 2.5mm*2.5mm,
2. Number of hoxels is J'*K'=337*188,
3. Number of spactrum is M*N=36*36,
4. Viewing angle is Ω=30⁰

Holographic coded pattern of the spactrum inside each small lens

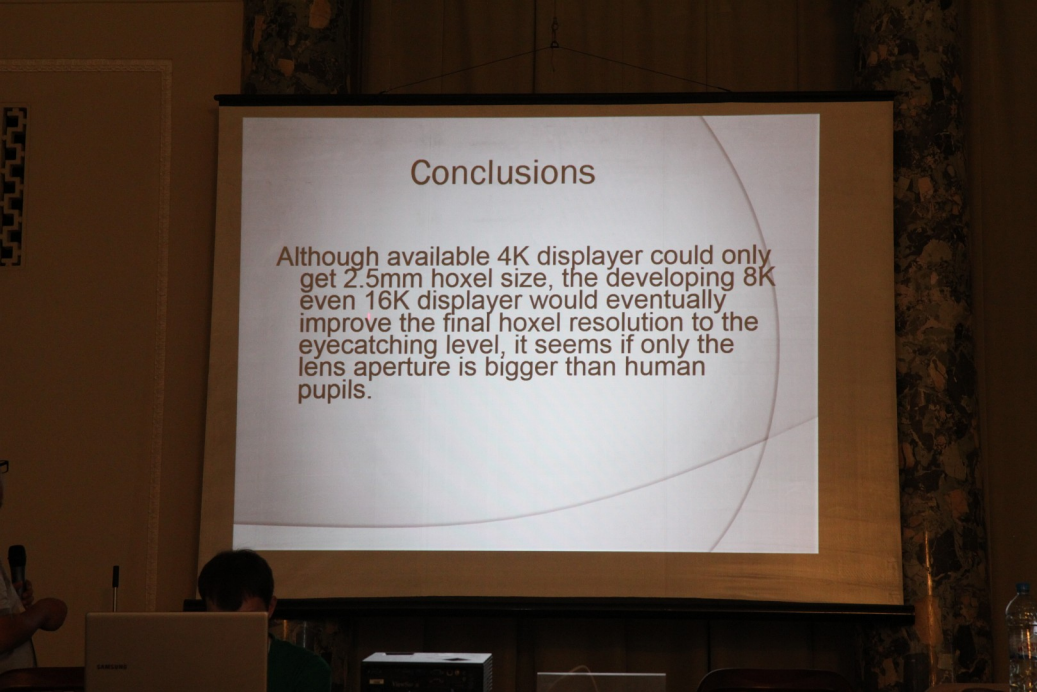



Restoring without HFS


Reconstruction decoded by HFS

Pictures taken from multi directions of the displayed digital 3D model

Pictures taken from “skull” holodisplay


Conclusions
Although available 4K displayer could only get 2.5mm hoxel size, the developing 8K even 16K displayer would eventually improve the final hoxel resolution to the eyecatching level, it seems if only the lens aperture is bigger than human pupils.