ISDCF Main Meeting Notes – August 10, 2022

<u>Upcoming Meetings</u>

ISDCF Tuesday October 4, 2022 10am   In Person at Deluxe (ITC) with a zoom component

ISDCF Wednesday December 14, 2022 (zoom only)

Part 0: Open Mic (15 minutes prior to meeting start time)

Part 1: General Reporting

Housekeeping:
- Zoom meeting (provided by NATO)
- Set next meeting dates (above).
- Thank you Universal for support of the Chairman.
- Thank you to Mark Collins for providing general expenses and admin support.
- Meeting notes from June '2022 approved
- InterSociety - **Membership Fees 2022**! Go to website to register and get an invoice. $500 per company per year / $100 individual membership.
  > Things are OK for InterSociety financially. We do need admin help on the financial front. Looking for Board members at this time.
- Legal reminder / press reminder / Antitrust Disclaimer. The official antitrust guidelines are posted on our website and are linked from the main ISDCF page. A short verbal overview of guidelines was given. Please no-social-media for discussions held at ISDCF.

Attendance is at end of these notes.

Action Items from August 10, 2022

1. **Membership Invoices 2022.** Join Inter-Society! https://isdcf.com $500 per company per year, $100 individual membership.
2. Contact ASC to help created a short StEM-2 segment for testing.
3. Contact sources for audio test content for LED wall sound testing (Brian)
4. Remaster ISDCF/DCPL still images for use on LED displays

5. Create a HDR trailer for LightYear (Pixar)
6. Review open caption positions on devient aspect ratio presentations (Kirk/Wade)
7. Get ISDCF 3D48 content available on the website (Steve)
8. Update Digital Cinema Naming Convention front page to have the illustrated guide visible. (Steve)

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LED Tours

We had an ISDCF Group Tour on July 12, 2022 to see the LG screen in Buena Park and the HeyLED screen in Chatsworth. The chairman wrote up his notes and they are attached to this report.

Kenny Chow gave an introduction to the HeyLED and his (redacted) slides are attached to this report. Highlights include the LED fill factor due to lensing of this 2K display.

While we did not have a presentation by LG for their screen, Susie Beiersdorf has provided a description of their installation:

> LG Installation Information:
>
> 4K screen/14M (46 ft) display set to perform at 14ftL/48 nits with standard dynamic range. Black level is set with floor of 0.012 nits, for an effective 4,000:1 contrast ratio. Pixel pitch is 3.3mm. The display consists of 176 individual cabinets, 8 high by 22 wide, mounted in a custom steel frame and precisely aligned.
>
> A Dolby IMS 3000 Media Block with custom software is embedded in the display for DCI playback. The audio is 7.1 with QSC speakers, controlled by the QSYS system.

Comments on presentation: The concept of "gain" does not apply to a direct view screen. We probably need a new/different term to make comparisons between direct view and projection systems. We should have a term to compare the ambient

light from the auditorium to the emission from the screen. The term is not "gain." It is more surface reflectivity. Diffuse and Specular reflectivities may be appropriate terms (DCI uses these in their specs).

It was reported that the sound system at the LG facility has been updated since our tour and should be better.

Comments on what was seen:

Most of the view that the images are very good. We question why the still images looked funny. We think it was a mastering issue.

The deep blacks really was key in making images look good. In particular the StEM-1 material was some of the best seen.

It was noted how good the 3D content looked on the HeyLED screen with active glasses. Very comfortable to watch and amazing views. Part was full brightness (equivalent of 14fL per eye), great extinction with the active glasses and the deep blacks.

The weight of the LG screen was around 8 tons. There was review needed for this installation since it is on the third floor. In the past it has not been a problem since the weight load is within normal building loads. It becomes more of a concern in earthquake country.

The fan noise was questioned, but since the "light" heat load is very different from the "dark" heat load (screen off). It does not seem to be a problem. In an actual installation in China the normal air conditioning system handles the heat from the screen without problems.

For ISDCF: We used a set of test material, but more is needed for LED screens.

We wanted to see "known content" and it didn't disappoint. We used:

1. ISDCF SMPTE-DCP test content B2.1
2. ISDCF Framing Chart (with faces) - 2K/4K

3. ISDCF / DCPL still images
4. DCI's StEM-1 film created, 4K test content
5. ASC's StEM-2 HDR graded test content

NEED:
Audio test material for direct view screens.
An edited version of the ASC StEM-2 (needs to be shorter)

Do the sound system providers have audio test content that could be shared with ISDCF? It's important to have audio-imaging content (sound locations).

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Big Picture things happening?

China limited releases - restriction of titles from outside country and internal titles as well. This could have an impact on the total global box office.

Pixar - HDR cinema package of LightYear!! Played in Texas on the Samsung Onyx screen. (100% of HDR screens in the US.) Is there an HDR trailer available? Not yet, will check!

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Caption Positioning

Positioning of open captions (rendered timed text) on non-standard formatted movies. (Deviant versions.)

One exhibitor has problem showing open caption when 2:1 or 2.2:1 movies are package in flat DCPs. The captions are being cut off the screen when presenting.

More testing/evaluation is necessary to see what's happening.

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3D Releases

A number of new (and re-release) 3D movies and 48fps are coming… are we ready?

One theater chain is doing a complete upgrade to be ready for the 3D season…
Some of the laser-based screens will be 14fL.

Pre-shows are now DCP based / 2D and the transition will be challenging.

Is there sufficient test material for the 48fps? More is needed! We could find the
3D48 that ISDCF used prior to Billy Lynn and get it available for use by the
community.

We might be able to get Gemini Man content (3D60), but the issue is subtitles/
captions and 60 is challenging. Probably not as helpful.

It's quieter than expected at this time…

Light meters in theaters? Very few - one exhibitor has 3 light meters for 500 screens.

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Immersive Audio

This is the third notice that we plan to change the DCNC site to reflect the use of
IAB as the preferred method of marking immersive content starting in August 2022.
ATMOS marking could be noted as a legacy marking. (Of course the DCNC is a
guide, not a standard, so some may continue to make content in a legacy way.)

We will add an issue in ISDCF's GitHub to request the change.

One member asked if we could wait until January 2023 since some systems are
being upgraded in the next few months. The motivation is to teach ATMOS
rendering systems to look for IAB. DTS systems are being upgraded to read both
DTS-X files and IAB files. It would be better to have them adopt IAB and not
transitionally use ATMOS files.

In order to make the change it is necessary to "rip the bandage off" and make the
change. We need to have studios/distributors make the decision to make the change
and mark content with IAB and not ATMOS. But the chicken and egg issue and
some studios are worried about "dark screens" so are reluctant to make the change.

Much like the change to SMPTE-DCP, someone needs to make the move and do it. We don't expect any dark screens. We *MIGHT* have a few screens not have immersive audio, they would just play the 5.1 or 7.1 in these screens.

There might be a concern that some TMS manufacturers parse the name and might not recognize the IAB name. In discussion, we think that that manufacturer has fixed this issue.

A suggestion is to make T-Shirts for projectionists - "IAB = ATMOS"

The usual question: Has anyone implemented new features in IAB *MASTERING* devices that others have implemented that need to be part of an IAB profile 1? (Nope)

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SMPTE update

SMPTE 429-20 MXF constraints. Passed ballot.

SMPTE September meeting cycle is open to all, not just SMPTE members. All invited.

428-22 dummy subtitles in process.

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Website and IT updates

Major update for language table.

The naming convention site does not have the illustrated guide on the home page. It will be updated to have a thumbnail link on the front page.

The reflector had information posted. Presented at the meeting with no comments obtained:

Tools for the Cinema?

[ISDCF] Open source tool to detect version info of DCI cinema equipment
[ISDCF] Digital Cinema CPL research - Looking for trends in the evolution of Cinema
Content A tool that would allow real time analysis of trends in DCP/CPLs. This came up
due to discussions on loudness levels and how, now digital and easy adjustments of the
volume level, many cinemas are no longer running at level 7.

I suggested we should see if there was any change in the way content was mixed and to do
this create a tool that would surface such trends.

Well, that tool is complete and those interested can find out more about it here in this video
which goes over exactly how it works..
https://youtu.be/I76LPOpkvt0

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Clipster mastering software

New version added a "Legacy" button, USE IT or things might not work right.

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Review of Action Items from last meeting.

Action Items from June 14, 2022
1. **Membership Invoices 2022.** Join Inter-Society! https://isdcf.com $500 per company per year, $100 individual membership.
2. Schedule LED tours for July 12. Must be a paid member to attend.

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Attendance on next page

Meeting Attendees - August 10, 2022

Name		
Andre Bonifay	Jeff Battles | Block by Block Solutions	Peter Ludé
Andy Lampard (MPS)	Jerry Pierce	Pierre-Anthony Lemieux
Anthony Foster | GDC	John Hurst	reinerdoetzkies
Bill Hogan	Kenny Chow	Sam Francois
Bittu Dey - Qube Wire	Kevin Draper | Christie	Sean Romano
Blake Beisswanger	Kevin Wines	Sterling Silva
Brian Slack	Kirk Griffin	Steve Hopkins (Eikon Group)
Brian Vessa	Lefko	Steve LLamb
Cedric Lejeune	Loren Nielsen (she/her)	Steve McClain
CJ Flynn | CinemaTestTools	Mark Collins	Steve McClain
Dan Huerta	Mark Waterston	Sunil Karanjikar
David Monk	Martina Berger	Thomas MacCalla
Dean Bullock	Matthew Sheby	Tim Ryan
Erik Anderson	Mike Radford	Trevor Endo
Frank Tees | MiT	Mike Renlund (Dolby)	Wade Hanniball
J. Sperling Reich	osalcedo	Yoshi Gonno
	pete.sellar	

ISDCF LED Tour - July 12, 2022

ISDCF held a viewing opportunity for two LED screens that are in the LA area. This was a chance for a group of professionals to share comments and observe the new technologies. To say the least, it was eye opening! I'm really sorry more folks didn't have a chance to join us.

Content:

We wanted to see "known content" and it didn't disappoint. We used:

1) ISDCF SMPTE-DCP test content B2.1
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4) DCI's StEM-1 film created, 4K test content
5) ASC's StEM-2 HDR graded test content

Additionally each vendor provided some "wow" content for viewing.

Note: We did not have good audio content for testing direct view screens. This is something ISDCF should address for future testing.

Screens:

In Buena Park we went to the LG screen in the CGV theater complex. This is a 4K/14M LG LED display. It is a 14fL / 48nits only screen (no HDR). It is in a "live" theater so we needed to visit in the morning when paying patrons were not in attendance. The audio system was from QSC.

In Chatsworth we went to the HeyLED test center. The 2K/10M LED screen is in an industrial room - not light tight for testing and evaluation. The sound system was not fully configured (not suitable for sound testing).

People:

We had about 25 people attend both demonstrations (and many attended the following lunch). Disappointingly there were no DCI members and only Lionsgate studio participation. Also disappointingly there was only one exhibitor attending (Kirk, representing Harkins) and the NATO Technical consultant (Jerry).

Highlights:

The 3D content on the HeyLED screen (screen at 300nits/active shutter glasses yielding a full 14fL to the eye) was stunning!! Tests would need to be conducted on 3D for ghosting etc. but it was really fantastic.

The 2K screen had mini-lenses in front of the LED point sources of light so the "dots" did not appear at normal viewing distances, but the structure grid around the square lenses did appear as a 'screen door' effect from almost all distances yielding a distraction for viewing. BUT the contrast ratio was great and the trade-off between a traditional 2K projector and the LED image would be a tough call.

General Comments:

The image created by both systems were stunning. Deep blacks, consistent highlights. It is possible that the StEM-1 footage was the best presentation that I have ever seen.

Issues:

While we couldn't test the audio system for the HeyLED screen, the LG system was challenged. It was noted that the LG audio system was still a work in progress and not finalized. In particular there was a noticeable back echo due to the flat front screen. (Especially when playing isolated left/right back surrounds.) In general there were echos. The localization of the voices seemed to be frequency dependent - lower frequencies seemed positioned low and higher frequencies positioned high on the screen.

The black levels were an interesting issue/opportunity. The DCI HDR/LED spec calls for a floor of 10mnits, but it was clear that the picture improved greatly when the screen was set for no floor. In fact it was essential that the masking areas require it to be off to look good. I think the black levels need to be further specified for all content and may require special mastering for these screens in the future - in fact it may be important to master all SDR grading with LED in mind, but experimentation and critical viewing will be necessary.

The high brightness of the HeyLED screen clearly added to the 3D imagery and also to the "lights on" playback of content. But in "lights out" there was not a clear advantage to the high brightness for image quality (using the ASC StEM-2 content). It was clear that HeyLED has some work to do with the PQ curve interpretation.

We did see temporal artifacts (vertical stripes) in the LG screen. We did not see it in the HeyLED screen.

While there were issues with the 2K display (screen door effect), it will be important to re-visit the request for a minimum of a 4K display. The cost/performance needs to be considered and the HeyLED screen is close to meeting the performance requirements (in my opinion).

NOT BELOW THIS>>>

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Genre

<u>LG Screen</u>
4k, 20 meter, Buena Park - Korean subbed movies

back echo from right and left surrounds was terrible
- people in the back heard lots of echo from the screen
-
center channel had split frequency response
- high frequency in the top speakers
- low frequency in the bottom speakers
- so female voices from the top
- male voices from the bottom

images were stunning
at one screen hight, can see some pixels
some edges in bright to light transitions
played STEM-1 - it was great (possible a 4k transfer)
- rich blacks
- beautiful whites
- consistent from edge-edge

- 48 nits

played STEM-2
- looked good
- but kinda different
- lots of test scenes to show off HDR
- no film grain

temporal artifact - "corn chip problem"
when your eyes jump up and down while chewing exposes the pixel timing

HeyLED Screen
10m screen
industrial room
- light leakage
- insufficient AC

lights on and playing trailers when entering
- running SDR trailers at 300 nits in bright room
- looked good - could be fine in a commercial room
- dine-in theater solution

2K - doesn't meet DCI LED Spec (must be 4K)
- each LED has a lens to decrease the observable pitch
- 4mm pitch
- black line between each pixel, which creates a fairly visible screen-door effect even out to 3 screen heights
  - Jerry thinks this is a solvable problem with little NRE - "white lines painted over the LED lens gap lines"

Active glasses 3D
- alternating frames
- 300 Nits on screen
- 48 Nits through the glasses
- "stunning" stereoscopic 3D
- low blacks were important for 3D

Some people complained about STEM-2. They could see pixelization on edge of arms.

Turned screen to 0 nit mode and 0.01 nit mode for comparison.

STEM-1 has grey bars top-bottom in 0.01, but black (or invisible bars in 0 nit mode.

Background

DCI spec for black levels for Standard definition content is wrong. If playing SDR content, must not be less than 10 (or 15) milli-nits on the screen.

0-48 nit
0.010 - 48 nit
0-108
0-1000

Perhaps an LED screen can use 0 nit for masking in letterbox mode.

ISDCF

HeyLED

Timewaying

Kenny Chow
2022-08-10
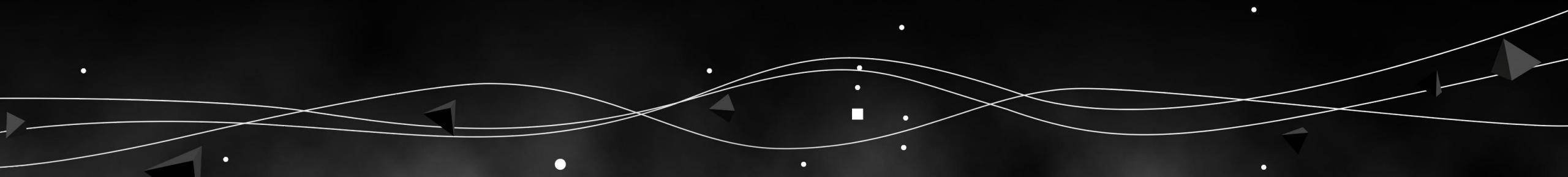
Meaning of HeyLED

"Hey" pronounced as the Chinese word "黑", which means Black
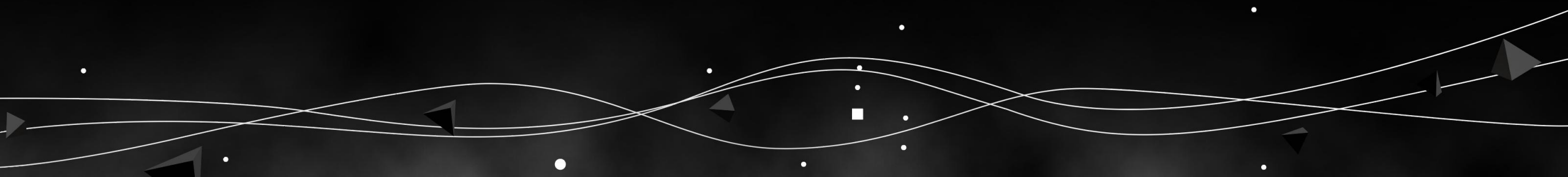
and

"Hey!"

Brand Name : HeyLED
Company Name : Timewaying

Brightness Range
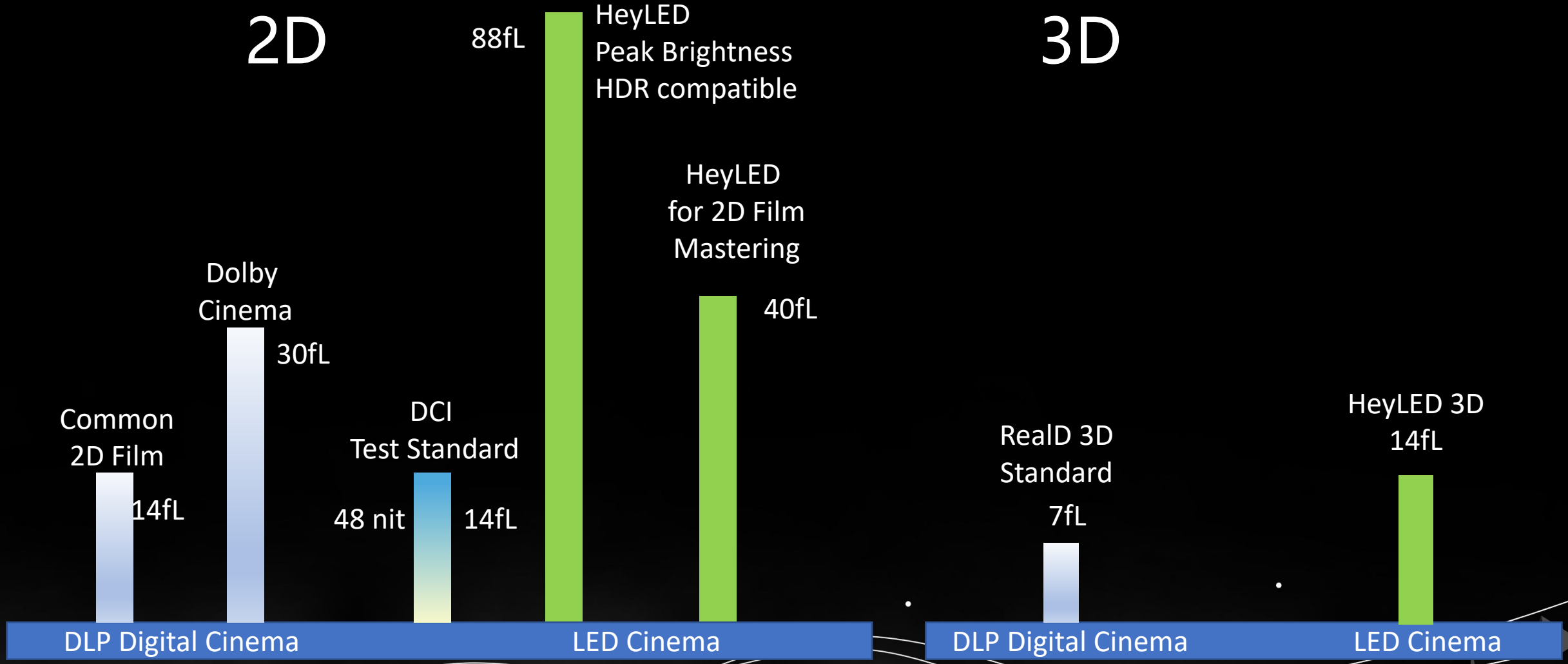
Grayscale - Optical Curve

HeyLED

Drive pixel brightness

300nit

HDR PQ

150 nit

SDR Gamma 2.6

48 nit/14fL

12-bit
Grayscale 0 to 4095

Black

White
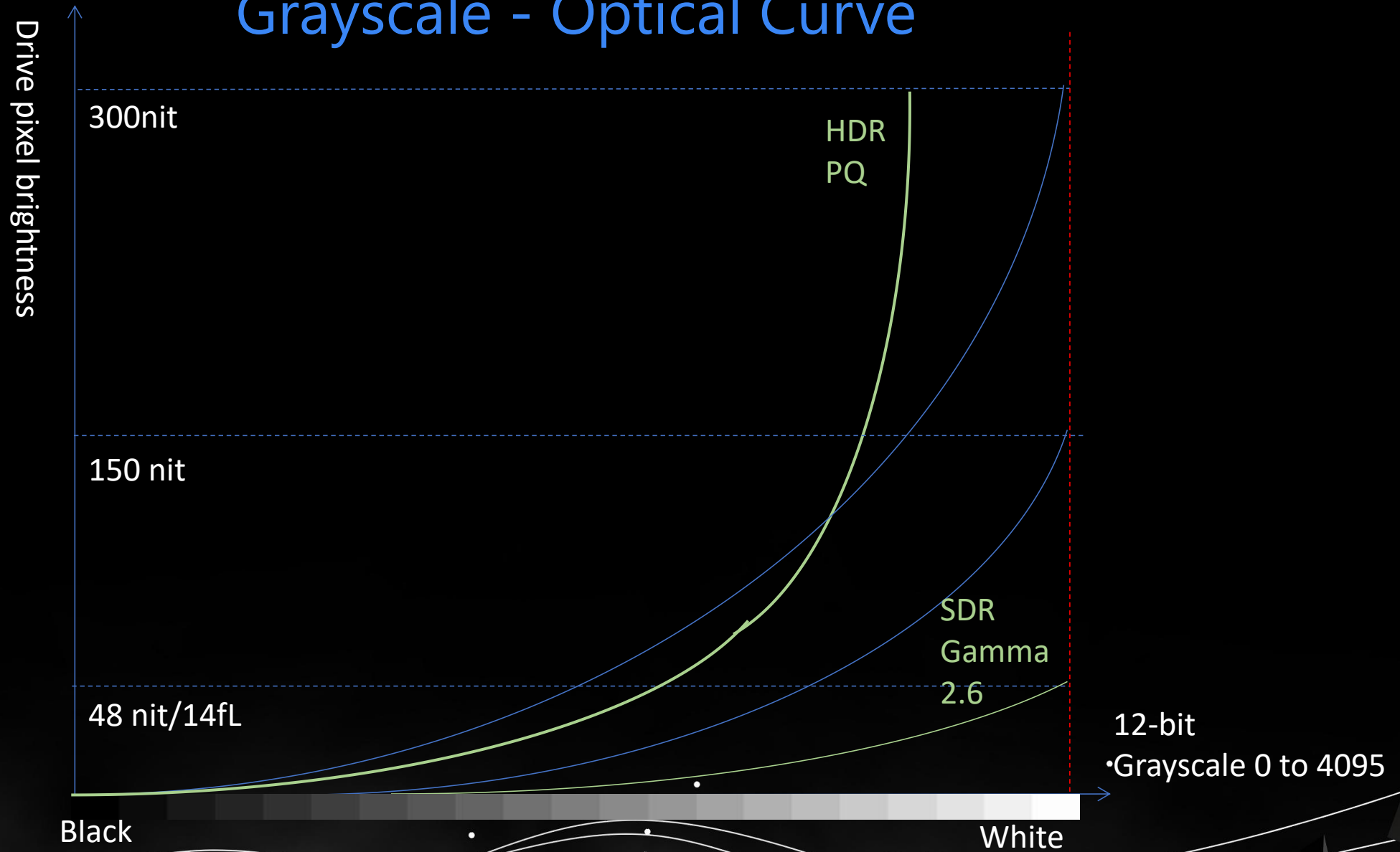
Pixel Fill Factor

HeyLED Advantage

1. No Pixel Glare, No Eye Fatigue
   Allow long time viewing without eye fatigue

2. Lower Investment for Same Size
   Implement 2K resolution, which is good enough for 10 meter wide screen

3. No Screen Door Effect
   When implemented to 4K, front row seat can be closer to screen, meaning,
   MORE SEATS
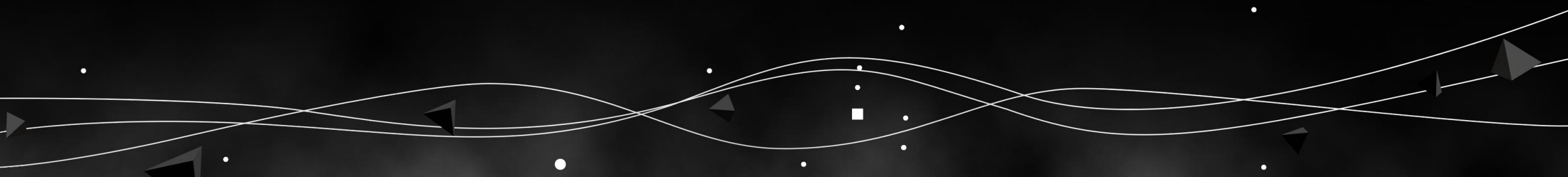
HeyLED With High Pixel Fill Optics
Pixel Fill Factor > 75%

Eliminating

Pixel Glare
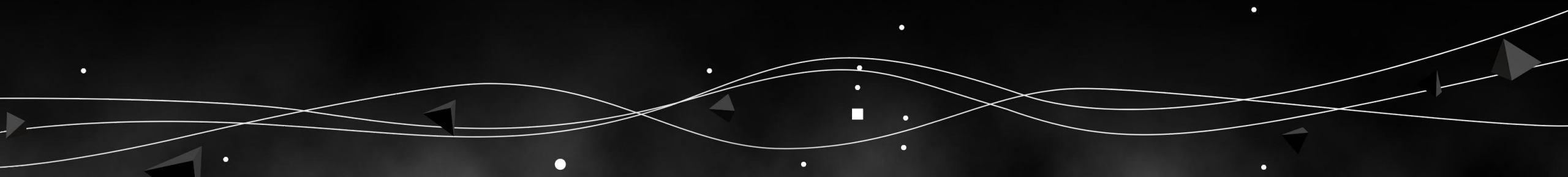
Pixel Spot
Luminance/
fL

Common LED
(6X) 528 fL
= 1795 nits

Imagine at
HDR

HeyLED
114 fL (1.3X)

Image/Screen
Luminance
88 fL (300 nits)

Pixel
Dimension/mm
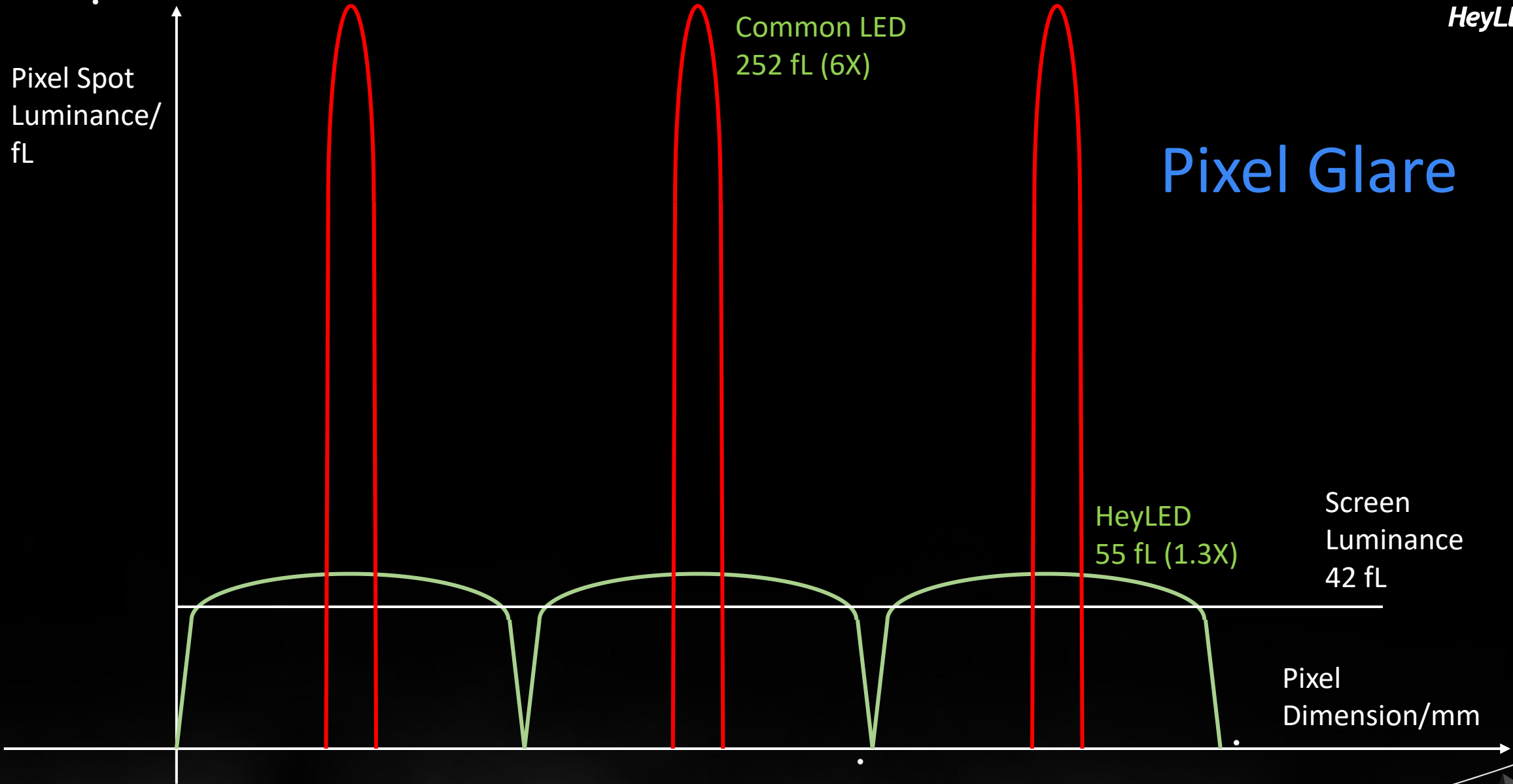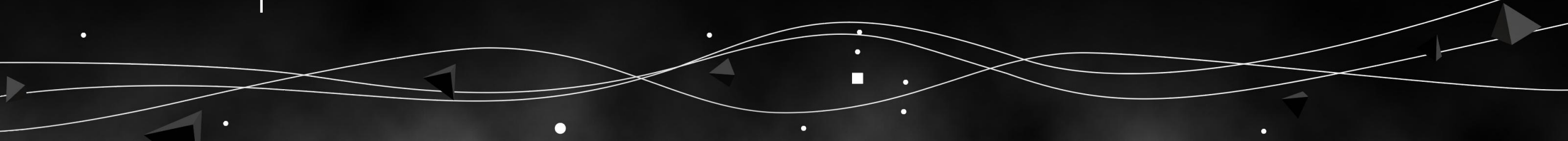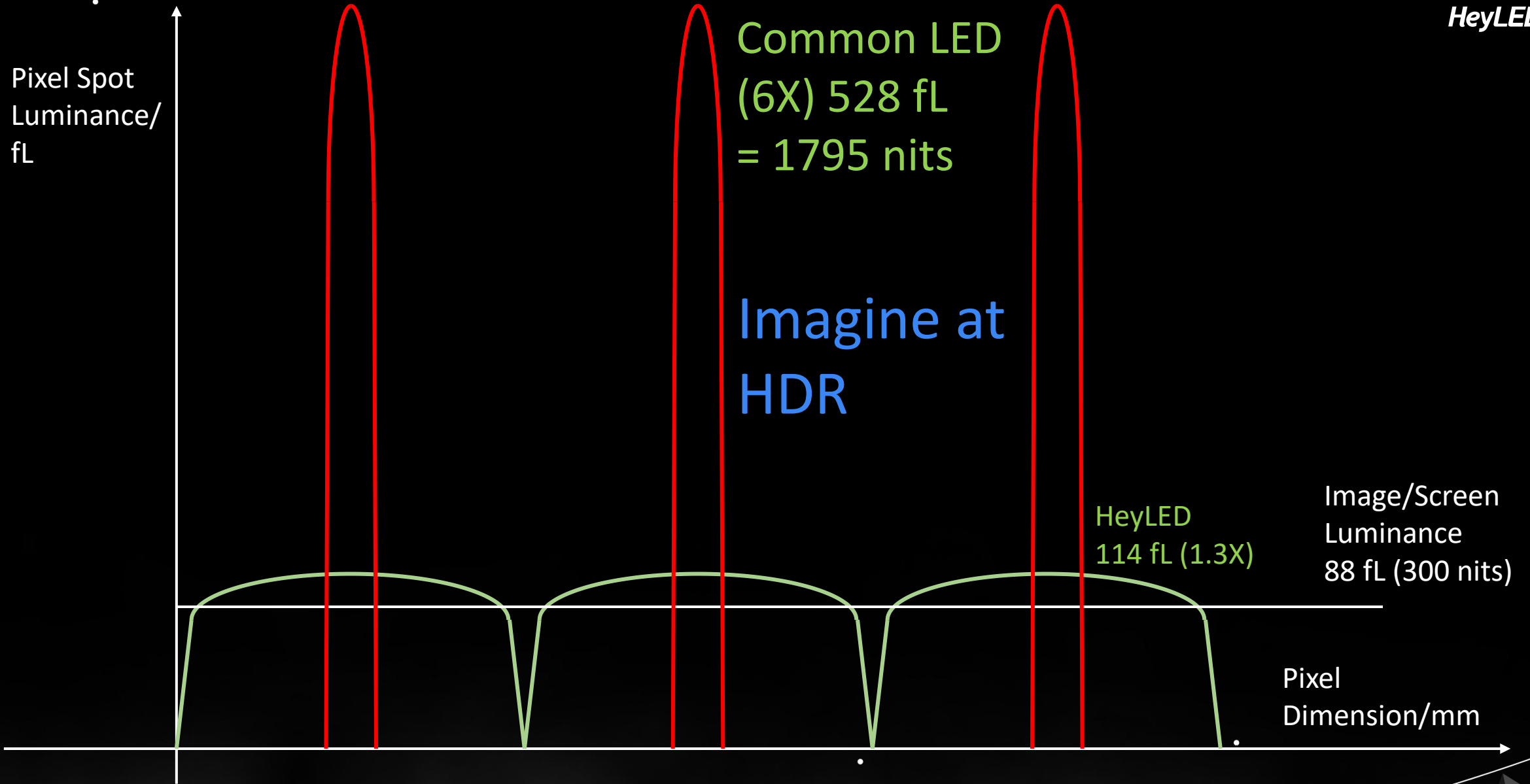
Screen Reflectivity

and

Intra-Frame Contrast

"Black Screen" VS " White Screen"

"Gain": 0.1   ~350 lux

Gain: 2.0   ~35 lux

Cinema illumination at ~350 lux

Cinema illumination at ~35 lux

Reflectance of the LED (measured when not lit) is 1/20 to 1/100 of the silver screen
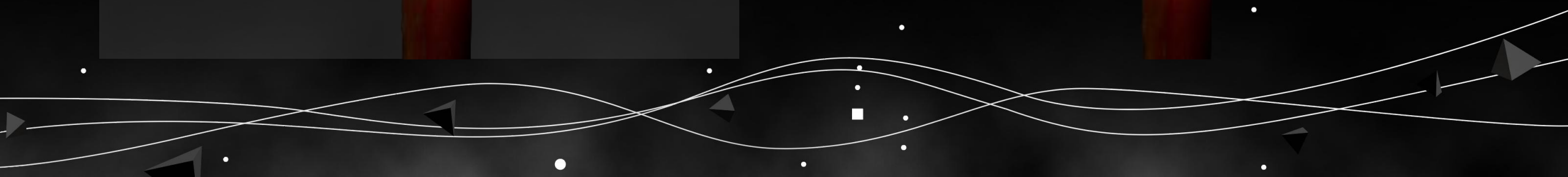
Deliver Stunning Image On A Truely Black Screen

LED screen can disappear into the background, providing "Floating Image" 3D experience.

Ordinary Cinema with White Screen

HeyLED Cinema Screen

"Floating 3D Image"

Barco White Paper 2018

Barco | Whitepaper
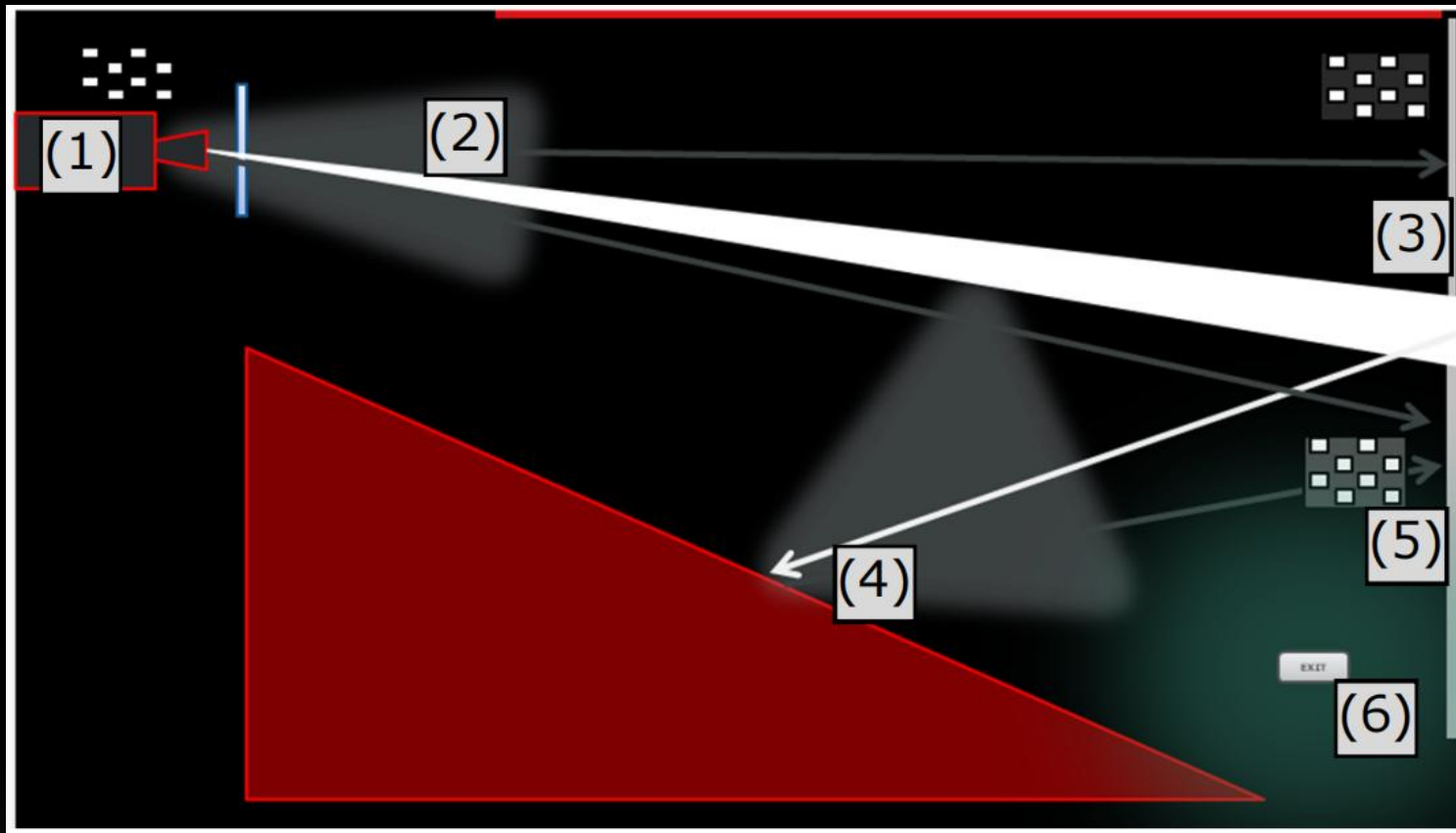
It's not all black and white

A journey through projector contrast specs

DATE   17/09/2018

AUTHOR   **Goran Stojmenovik** | Sr. Product Manager Laser Projection | goran.stojmenovik@barco.com

Barco White Paper 2018

Lost of Contrast:
(factors raising Black Floor Level)

(1) Projector
(2) Porthole Glass
(3) Haze in the air
(4) Seats, Floors, People
(5) Secondary Reflection
       Auditorium Reflectivity Coeff. "r"
(6) Exit Signs, Stair Lighting etc.

Barco White Paper 2018

How does average image brightness impact on-screen contrast?

So far, we have spoken about the ANSI contrast (native or on-screen). However, most scenes in a movie are much darker than even the ANSI pattern. In order to quantify this, let us introduce the concept of "APL" - Average Picture Luminance - which, simply put, is the total light the image carries as a percentage of the total light available in a full white field.

The APL of an ANSI contrast pattern is 50%, since half of the image is white and half of it is black. Figure 2 shows generalized test patterns that are derived from the ANSI pattern, but with APL levels varying between 1% and 50%. Such patterns are used to represent any realistic image that has the same average luminance as the test pattern.
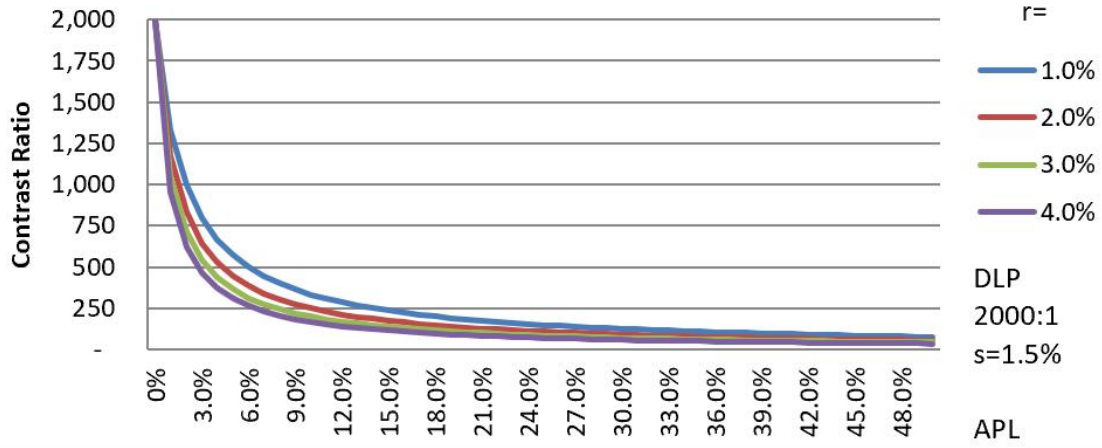

| APL = | 1% | 10% | 25% | 50% (ANSI) |

Figure 2: ANSI-like patterns with varying levels of white field representation (APL) between 1% and 50%.
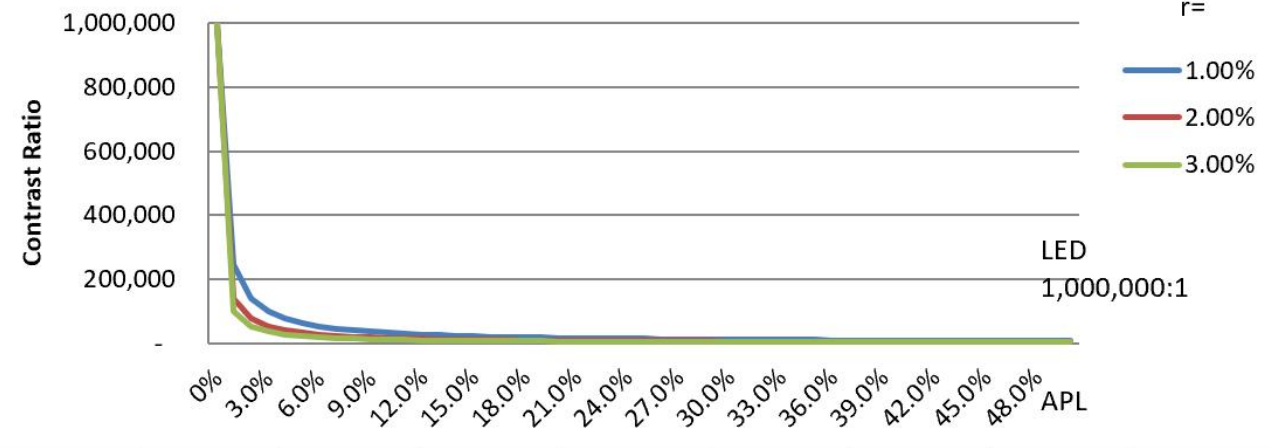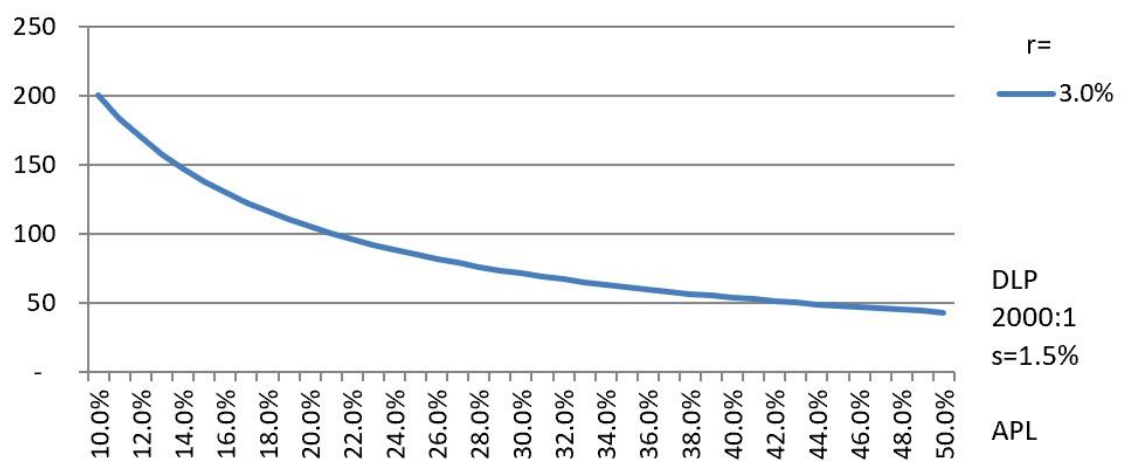
Concept of:

APL

Average Picture Luminance

In-Frame Contrast Ratio vs Auditorium Reflectivity
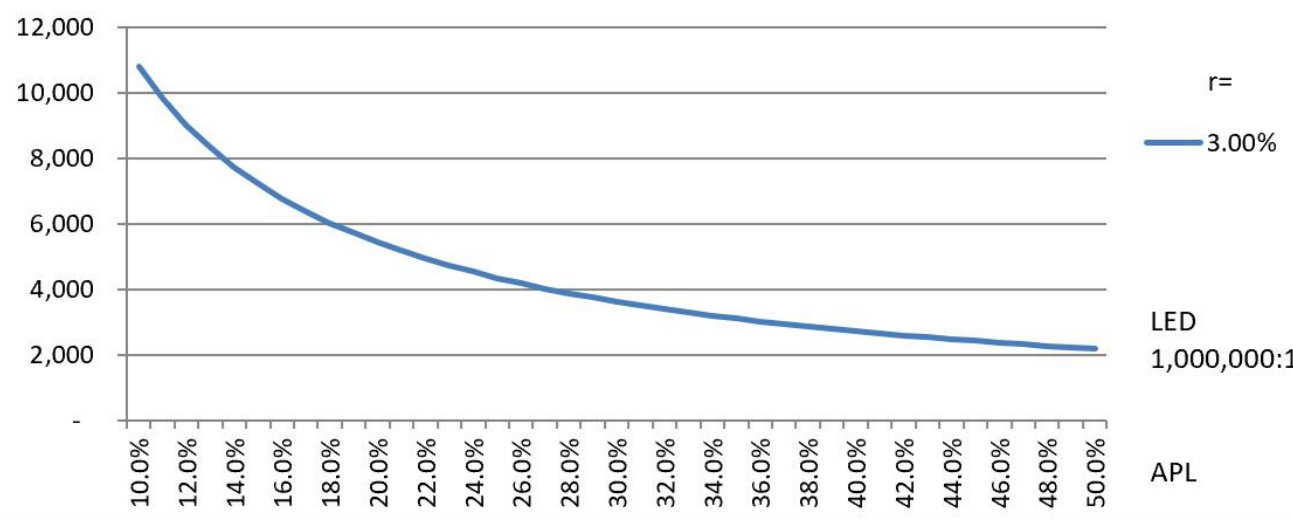(DLP Projector on Gain 1.8 Screen)

In-Frame Contrast Ratio vs Auditorium Reflectivity
(LED)

DLP on Screen with Gain 1.8
(enlarged for APL>10%)

LED (enlarged for APL>10%)

DCI HDR Spec

Table 2: Image Parameters & Tolerances for HDR Reference Display

Sec-tion	Parameter	Nominal	HDR Reference Projector		HDR Direct View Display	
			Review Room Tolerance	Exhibition Theater Tolerance	Review Room Tolerance	Exhibition Theater Tolerance
9.1, 9.2	Luminance, center, Peak Luminance, White-1 D65	299.6 cd/m² (87.6 fL)	± 18.0 cd/m²	± 30.0 cd/m²	± 9.0 cd/m²	± 9.0 cd/m²
	Luminance, Screen Average, White-1 D65	299.6 cd/m² (87.6 fL)	N/A	N/A	± 9.0 cd/m²	± 9.0 cd/m²
	Luminance, sides	299.6 cd/m² (87.6 fL)	85% to 100% of center	75% to 100% of center	± 9.0 cd/m²	± 9.0 cd/m²
	Luminance, corners	299.6 cd/m² (87.6 fL)	85% to 100% of center	Not Specified	± 9.0 cd/m²	± 9.0 cd/m²
9.3	Minimum Active Black Level	0.005 cd/m² (0.0003 fL)	± 0.001 cd/m²	± 0.001 cd/m²	± 0.001 cd/m²	± 0.001 cd/m²
	White chromaticity					

Focused on

MABL

Minimum Active Black Level

Table 4: Black-To-Dark Gray Step-Scale Test Pattern Code Values, Luminance Values, & Chromaticity Coordinates

All measurements are made in the center of the Screen.

	Input Code Values			Output Chromaticity Coordinates		Output Luminance
Step Number	X''	Y''	Z''	x	y	Y, cd/m²
1	60	62	65	0.3095	0.3296	0.0050
2	74	76	79	0.3134	0.3302	0.0075
3	86	88	92	0.3133	0.3281	0.0100

DCI Direct View Spec

6.8 Surface Reflectivity

Since light reflecting from the auditorium off the screen will degrade the perceived contrast, a low reflectivity is required. Since the screen surface may exhibit reflectivity with different optical characteristics, both Diffuse reflectivity and Specular reflectivity requirements are defined. *Reflectivity measurement shall be made using a spectrophotometer meeting the criteria of Section A.4, to measure di:8° and de:8° values [CIE Technical Report 15]. The screen shall be turned off or input set to code value zero for this test to ensure that no light is emitted from the pixels.*

6.8.1 Diffuse reflectivity

Diffuse reflectivity is measured by de:8° value, which shall not exceed the value in Table 2.

6.8.2 Specular reflectivity

Specular reflectivity is calculated using formula di:8° - de:8°, which shall not exceed the value in Table 2.
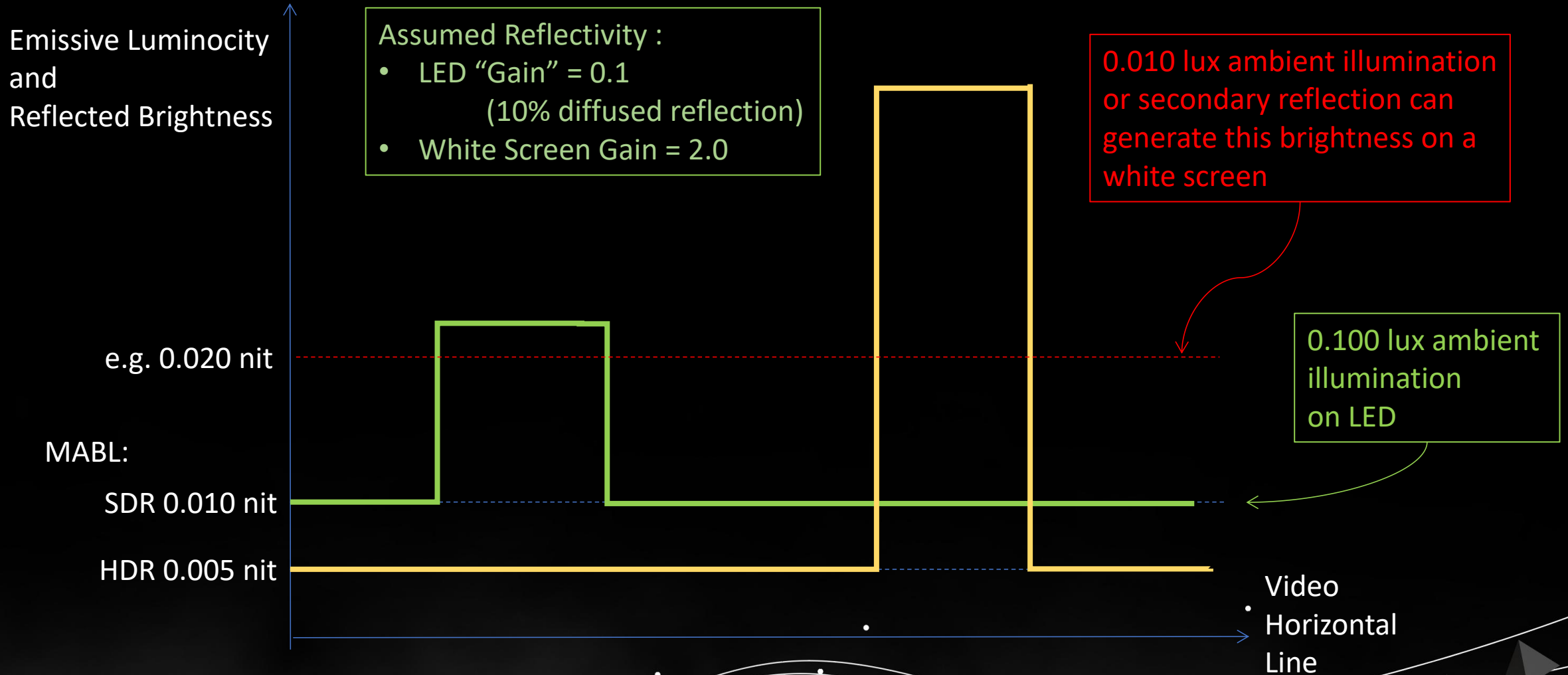
Reflectivity is Key to HDR

- Practical Intra-Frame Contrast Ratio in real life auditorium

- Should combine concept of:
    - ARC – Auditorium Reflectivity Coeff.
    - APL - Average Picture Luminance

Table 2: Image Parameters & Tolerances for D-Cinema Direct View Displays

Section	Image Parameter		Nominal	Tolerance
6.8	Screen Surface Reflectivity	Diffuse Reflectivity		Less than 10%
		Spectral Reflectivity		Less than 1.6%

MABL vs Ambient Reflection

Emissive Luminocity
and
Reflected Brightness

Assumed Reflectivity :
- LED "Gain" = 0.1
  (10% diffused reflection)
- White Screen Gain = 2.0

0.010 lux ambient illumination or secondary reflection can generate this brightness on a white screen

0.100 lux ambient illumination on LED

e.g. 0.020 nit

MABL:

SDR 0.010 nit

HDR 0.005 nit

Video
Horizontal
Line

Why HeyLED 3D is Good ?
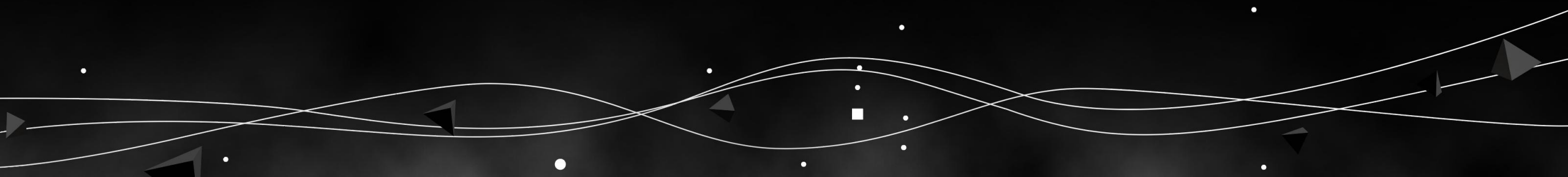
Best 3D Ever

- LED screen can disappear into the background
- "Floating 3D Image" experience

This is realized by :

14fL High Brightness 3D

\+

Extra Low 3D Crosstalk, less than 0.3%

\+

Contrast Ratio of 30,000 to 1 (300 nits / 0.01 nit)

HeyLED

Timewaying

Kenny Chow