

PanDORA: Casual HDR Radiance Acquisition of Indoor Scenes for Image-Based Lighting

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Mohammad Reza Karimi Dastjerdi¹, Dominique Tanguay-Gaudreau¹, Frédéric Fortier-Chouinard¹, Yannick Hold-Geoffroy², Nima Kalantari³, Jean-François Lalonde¹

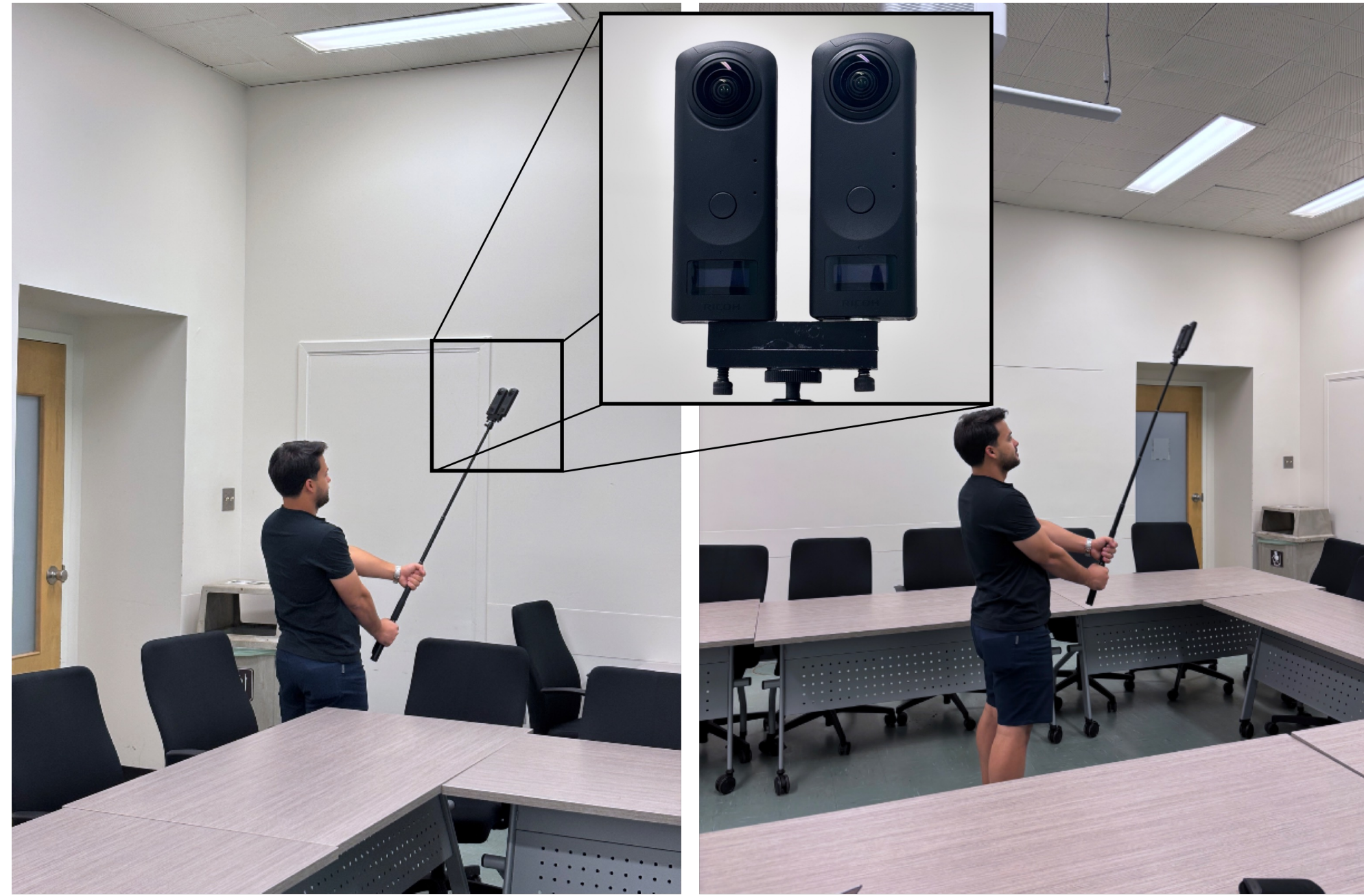
<https://lvsn.github.io/pandora/>



TL;DR

How to capture the high dynamic range (HDR) lighting of a scene, in an affordable and straightforward manner?

Here is our proposed capture apparatus, which allows users to casually scan rooms.



We capture two 360° videos with different exposures.

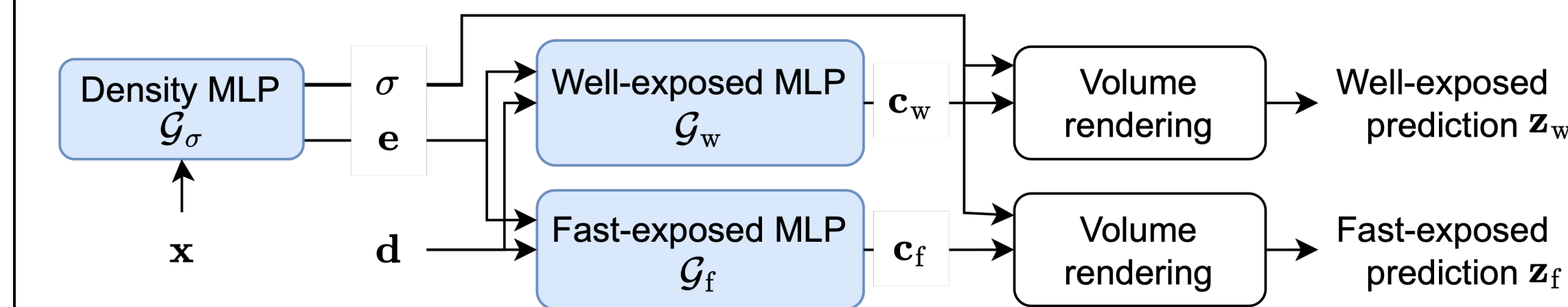


Our method produces a spatially-varying HDR radiance field for Image-Based Lighting (IBL).

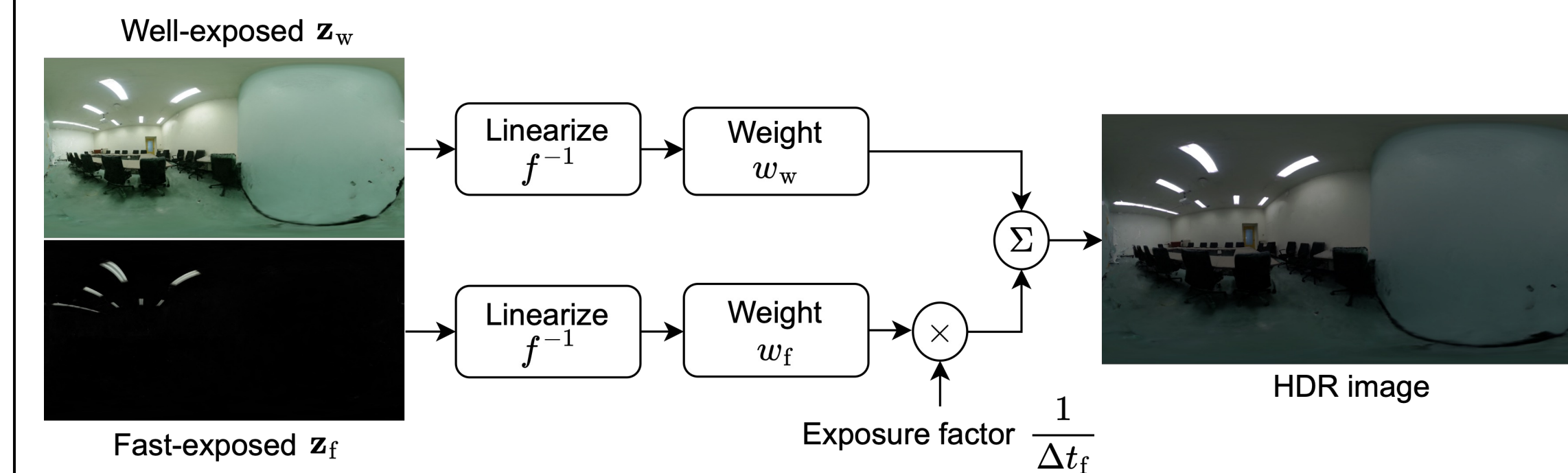


METHOD

NeRF architecture for the HDR prediction

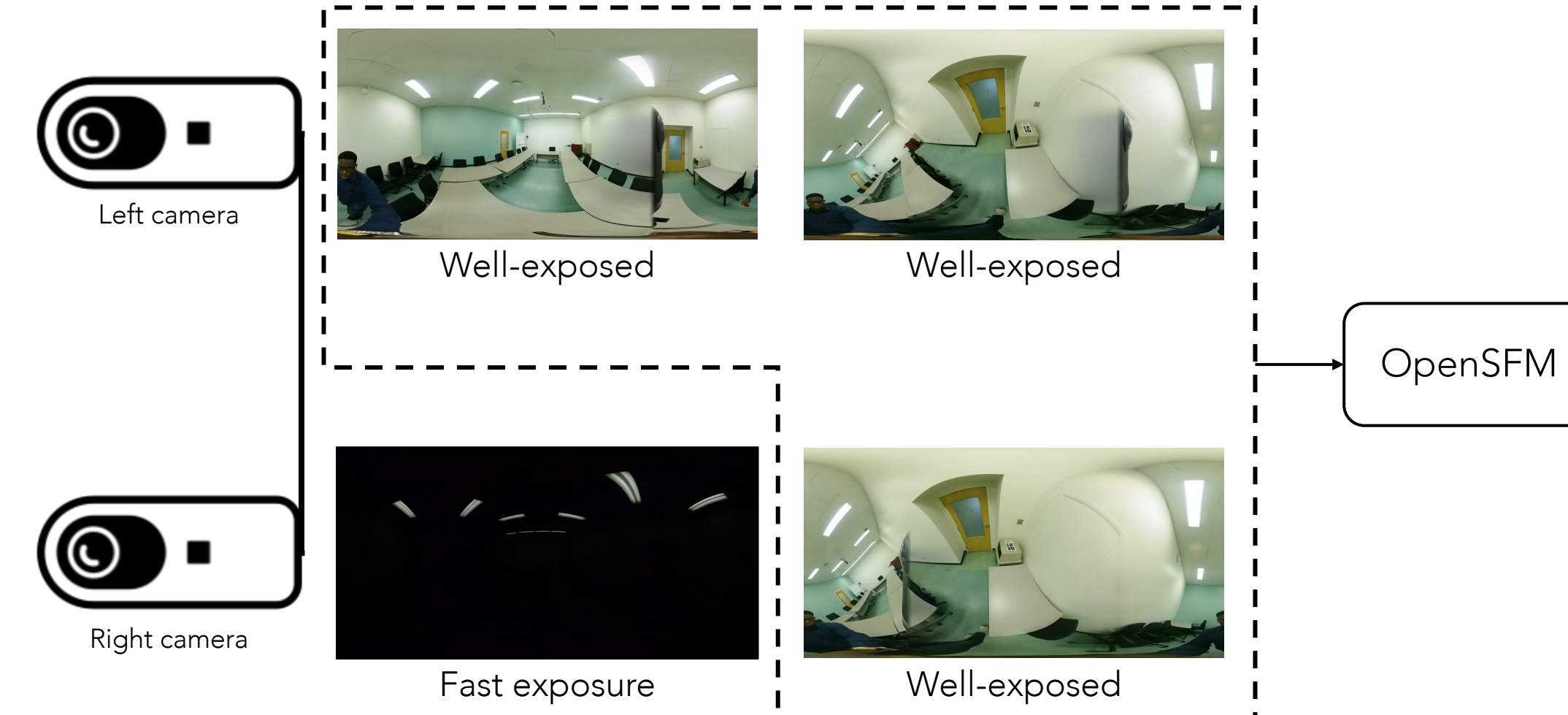


Recovering the HDR prediction

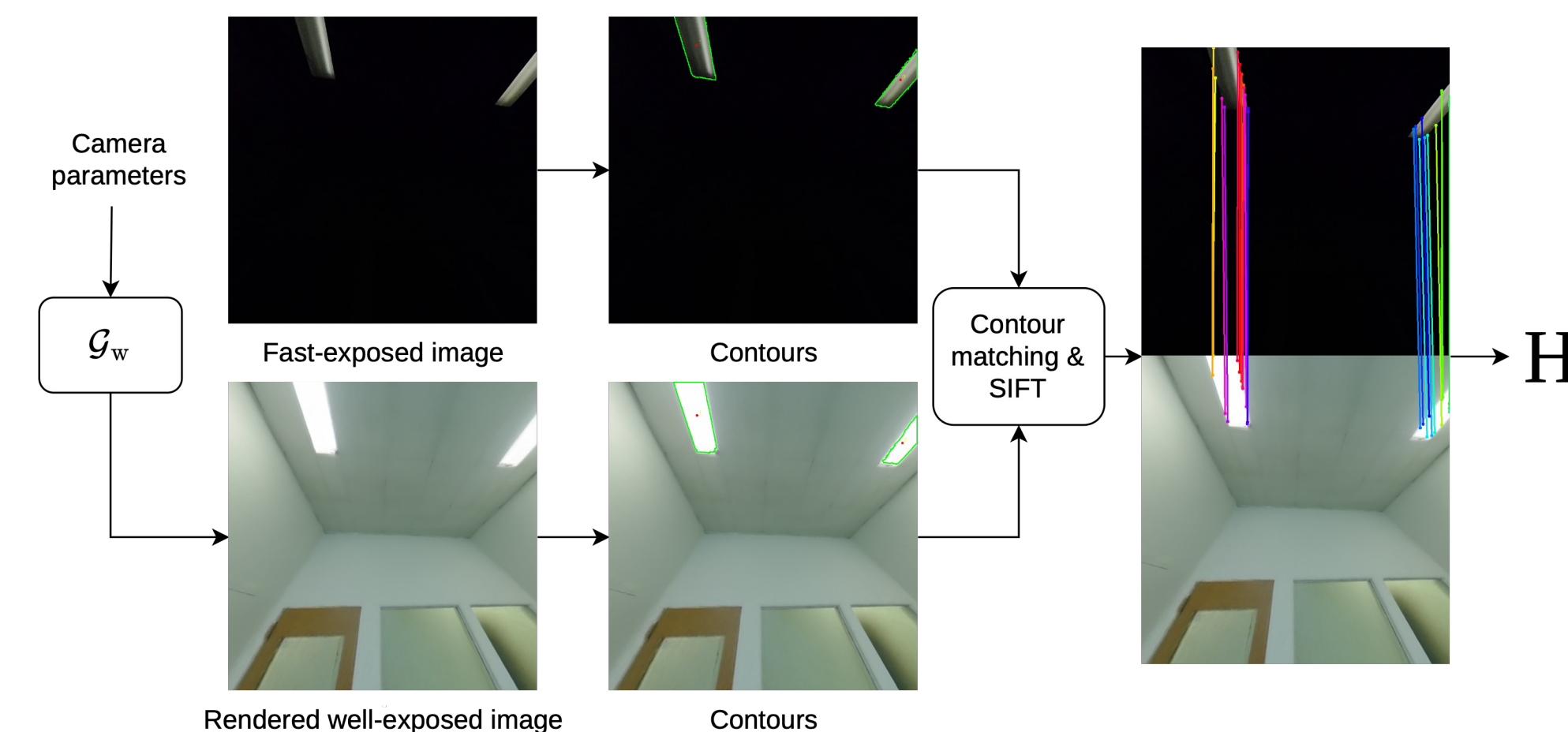


Self-calibrating pose estimation

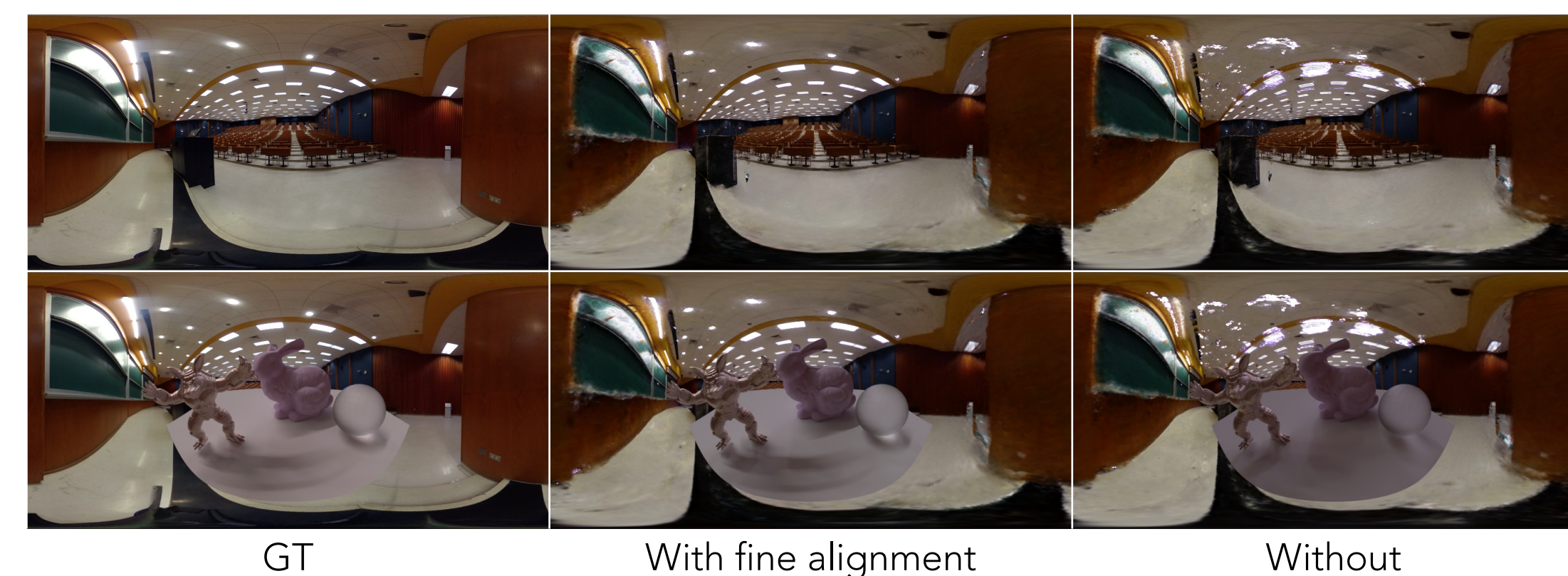
Pre-training



Fine alignment during training



Effect of fine alignment

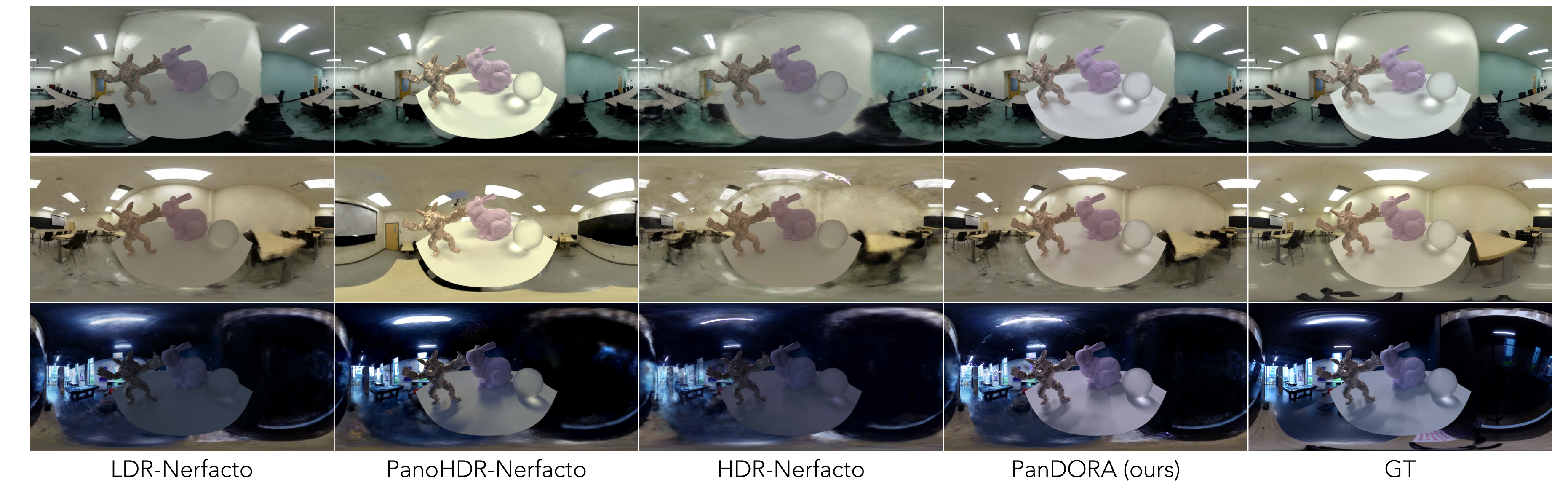


DATASET

A novel dataset of 14 indoor scenes captured by our acquisition system showcasing a variety of indoor environments.

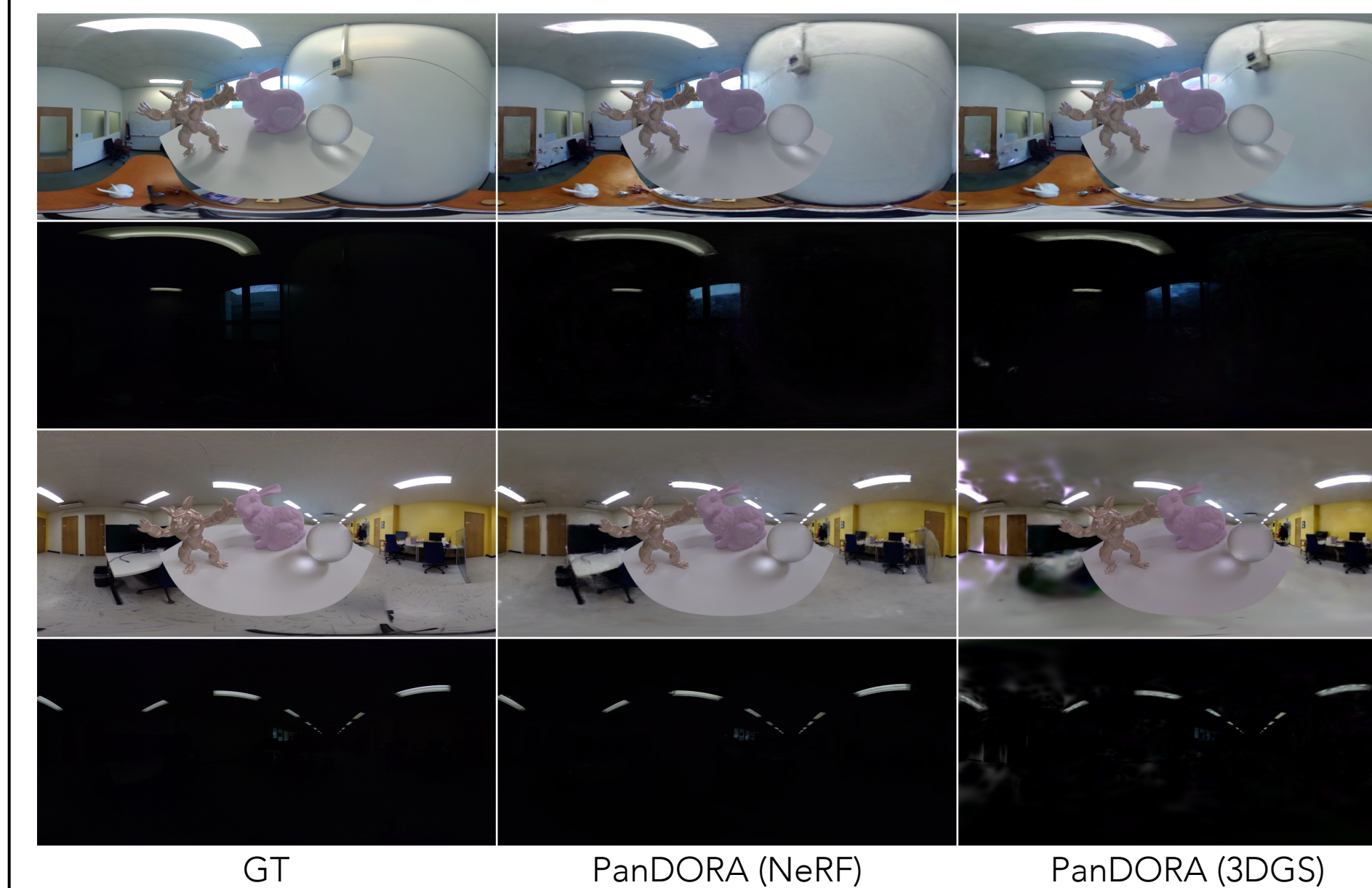
Scene	#Train	#Aux	Well exposure (s)	#GT	Exposure ratio
LOBBY	434	118	1/400	15	62x
CLUBHOUSE	708	172	1/125	15	200x
LIVING ROOM	652	170	1/250	15	100x
BLUE BEDROOM	218	58	1/50	15	500x
MEETING ROOM	412	100	1/250	15	100x
AUDITORIUM	310	74	1/250	15	100x
CLASSROOM-NO WINDOWS	570	138	1/320	15	78x
CLASSROOM-WINDOWS	1250	300	1/320	15	78x
BASEMENT	422	94	1/50	15	500x
SMALL OFFICE	358	44	1/200	12	125x
COFFEE ROOM	226	76	1/250	15	100x
OFFICE	328	78	1/250	15	100x
AUDITORIUM-DARK	258	68	1/50	15	500x
LAB OFFICE	848	82	1/320	18	78x

RESULTS



Method	LDR panos			HDR panos			HDR render			LDR r.
	PSNR↑	SSIM↑	LPIPS↓	PU-PSNR↑	HDR-VDP↑	PU-SSIM↑	si-RMSE↓	RMSE↓	RGB ang. ↓	PSNR↑
LDR-Nerfacto	20.02	0.66	0.40	26.81	6.25	0.90	0.28	0.40	5.40	27.97
PanoHDR-Nerfacto	19.51	0.62	0.44	28.43	6.64	0.90	0.18	0.31	6.25	29.18
HDR-Nerfacto	19.27	0.60	0.50	27.59	6.34	0.89	0.23	0.36	4.07	28.26
PanDORA (ours)	19.83	0.65	0.40	29.08	6.64	0.90	0.17	0.26	3.59	29.42

PanDORA (NeRF vs. 3DGS)



Limitations

