icassp_2026_Response

This repository provides supplementary experimental results to address the reviewers' comments, including extended baselines, dataset details, and quantitative comparisons under uniform/non-uniform lighting.

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1. Extended Experimental ()

1.1 Datasets

We evaluate our method on two representative datasets covering diverse lighting scenarios:

Dataset	Number of Scenes	Lighting Scenarios	Split Ratio (Train/Test)
MipNeRF360-varying	7	Varying exposure + normal lighting	7:1
LOM	5	Low-light + normal lighting	7:1

1.2 Extended Baseline Methods

We add **LLGS (ICASSP 2025)** as an extra baseline, covering classic and state-of-the-art methods:

Method	Conference (Year)	Core Contribution
3DGS	ACM Trans. Graph. (2023)	Basic 3D Gaussian Splatting
Aleth-NeRF	AAAI (2024)	Illumination adaptive via concealing field
GS-W	ECCV (2024)	Gaussian feature decoupling for wild scenes
Luminance-GS	CVPR (2025)	View-adaptive curve adjustment for lighting
LLGS	ICASSP (2025)	Gaussian illumination via absorptance modulation

1.3 Experimental results

The following table presents the performance metrics (PSNR↑, SSIM↑, LPIPS↓) of various methods under non-uniform illumination conditions on the NeRF360-Varying dataset.(Note: ✅ indicates the best-performing metric for each evaluation item.)

scene	metric	3DGS	Aleth-NeRF	GS-W	Luminance-GS	Ours
	PSNR ↑	**18.523** ✅	12.943	15.616	18.383	18.237

scene	metric	3DGS	Aleth-NeRF	GS-W	Luminance-GS	Ours
"bicycle"	SSIM ↑	0.514	0.195	0.563	0.646	**0.691** ✅
	LPIPS ↓	0.396	0.796	0.371	0.330	**0.274** ✅
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	PSNR ↑	20.187	12.685	20.482	20.984	**21.526** ✅
"garden"	SSIM ↑	0.736	0.229	0.756	0.791	**0.807** ✅
	LPIPS ↓	0.203	0.813	0.212	0.195	**0.191** ✅
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	PSNR ↑	15.098	12.454	15.892	16.850	**17.341** ✅
"counter"	SSIM ↑	0.527	0.324	0.624	0.645	**0.739** ✅
	LPIPS ↓	0.368	0.780	0.337	0.302	**0.224** ✅
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	PSNR ↑	12.533	8.141	15.526	15.708	**17.973** ✅
"bonsai"	SSIM ↑	0.299	0.403	0.554	0.563	**0.684** ✅
	LPIPS ↓	0.561	0.685	0.419	0.433	**0.273** ✅
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	PSNR ↑	22.310	11.357	20.672	**23.100** ✅	16.858
"kitchen"	SSIM ↑	0.831	0.397	0.802	0.833	**0.848** ✅
	LPIPS ↓	0.177	0.579	0.164	**0.143** ✅	0.148
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	PSNR ↑	14.354	7.151	**17.198** ✅	16.825	17.150

scene	metric	3DGS	Aleth-NeRF	GS-W	Luminance-GS	Ours
"room"	SSIM ↑	0.549	0.315	0.558	0.643	**0.762** ✅
	LPIPS ↓	0.299	0.733	0.375	0.319	**0.245** ✅
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	PSNR ↑	16.619	12.434	14.891	15.639	**19.458** ✅
"stump"	SSIM ↑	0.476	0.471	0.503	0.532	**0.664** ✅
	LPIPS ↓	0.402	0.665	0.432	0.389	**0.304** ✅

Add the method LLGS (ICASSP) for comparison on the LOM dataset. Training with a mixed dataset of normal-light and low-light images(Note: ✅ indicates the best-performing metric for each evaluation item.)

scene	metric	3DGS	Aleth-NeRF	GS-W	Luminance-GS	LLGS	Ours
	PSNR ↑	18.447	9.378	**26.747** ✅	20.358	15.753	22.371
"bike"	SSIM ↑	0.547	0.254	0.851	0.754	0.623	**0.858** ✅
	LPIPS ↓	0.328	0.751	0.278	0.368	0.445	**0.219** ✅
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	PSNR ↑	14.472	13.288	**27.012** ✅	16.486	22.877	26.119
"buu"	SSIM ↑	0.634	0.633	0.895	0.741	0.878	**0.916** ✅
	LPIPS ↓	0.407	0.639	0.199	0.376	0.218	**0.176** ✅
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	PSNR ↑	16.582	12.229	19.173	16.161	16.543	**19.845** ✅

scene	metric	3DGS	Aleth-NeRF	GS-W	Luminance-GS	LLGS	Ours
"shrub"	SSIM ↑	0.449	0.169	0.557	0.667	0.511	**0.714** ✅
	LPIPS ↓	0.374	0.713	0.289	0.207	0.366	**0.204** ✅

2. Experimental results under normal illumination conditions

2.1 Quantitative Comparisons (normal Lighting)

We report the SSIM/PSNR/LPIPS metrics of our method under both uniform lighting conditions (lower LPIPS = better perceptual quality) to better evaluate the contribution of our approach.

The following table shows the average results of the MipNeRF360-varying dataset under normal illumination conditions.(Note: ✅ indicates the best-performing metric for each evaluation item.)

	SSIM	PSNR	LPIPS
3DGS	0.870	28.691	0.182
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Pixel-GS	0.886	29.490	0.152
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Ours	**0.895** ✅	**29.601** ✅	**0.108** ✅

The quantitative comparison results of SSIM/PSNR/LPIPS across all scenarios under normal illumination conditions are presented in the following table.(Note: Red font indicates the optimal metric value.)

	bicycle	bonsai	counter	garden
3DGS	0.771/25.246/0.205	0.938/31.980/0.205	0.905/28.700/0.204	0.868/27.410/0.103
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Pixel-GS	0.793/25.739/0.173	0.951/32.697/0.162	0.921/29.299/0.162	0.878/27.834/0.094
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Ours	0.808/26.365/0.204	0.955/32.183/0.057	0.920/29.373/0.080	0.893/28.549/0.096

	kitchen	room	stump
3DGS	0.922/30.317/0.129	0.914/30.632/0.220	0.775/26.550/0.210
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	kitchen	room	stump
Pixel-GS	0.936/31.956/0.106	0.930/31.794/0.183	0.796/27.111/0.181
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Ours	0.954/32.107/0.041	0.950/32.115/0.064	0.787/26.518/0.211

Although our method is specifically proposed for non-uniform illumination scenarios, experimental results demonstrate that it still achieves state-of-the-art (SOTA) performance even under normal illumination conditions.

2.2 Qualitative comparison under normal and non-uniform illumination conditions

3. Comparison of Colors Before and After Conversion

Before color conversion	After color conversion