

# Physically-Based Post-Processing Framework for Emulating Analog Color Photography

Daiki Nakajima

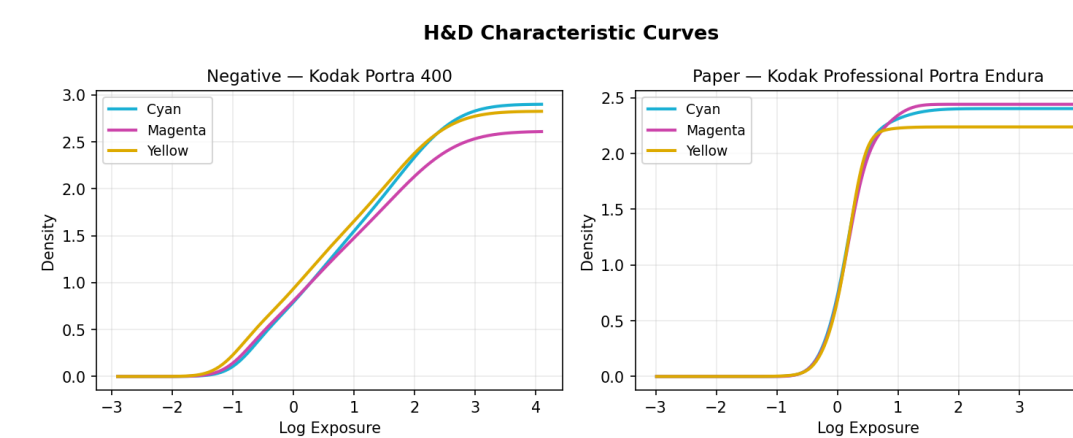
Department of Electrical Engineering, Stanford University

## Motivation

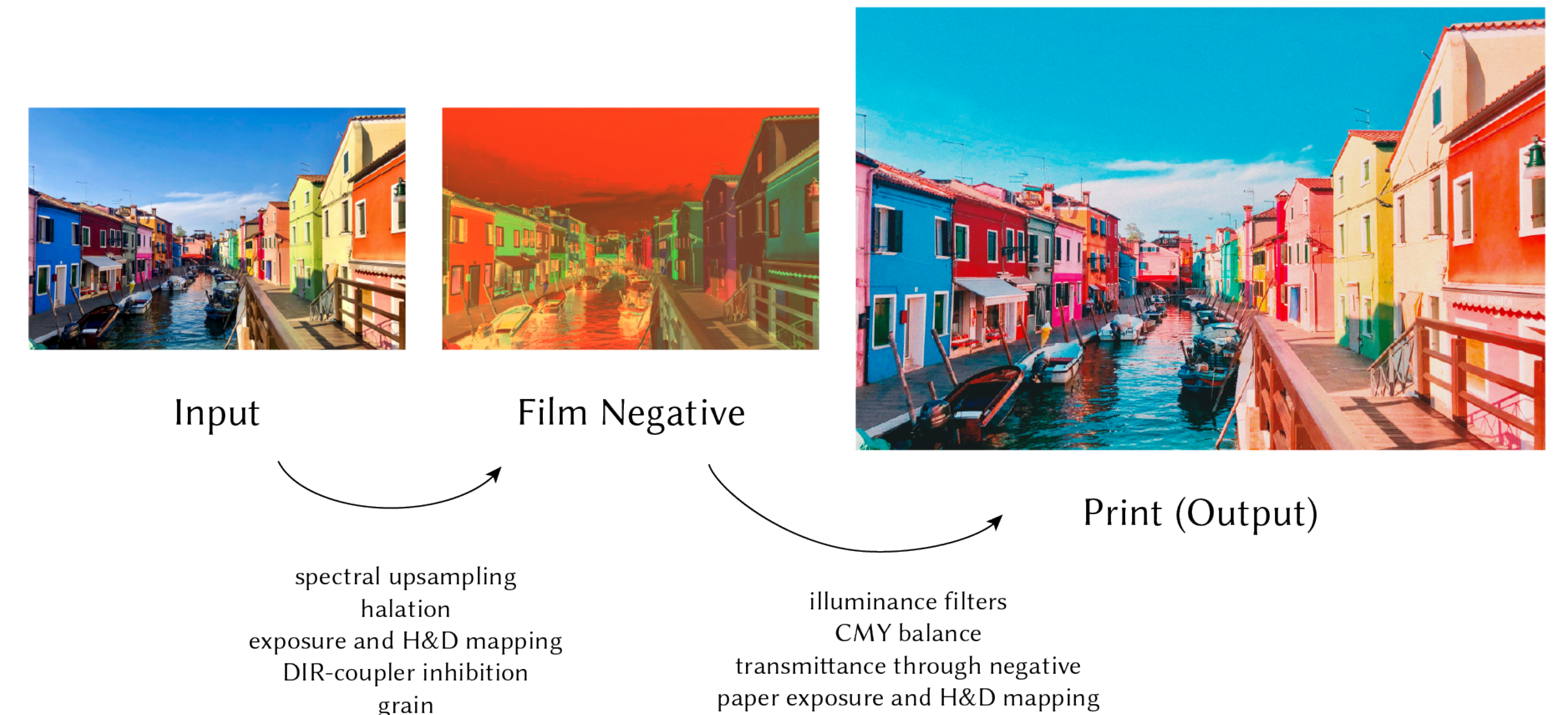
- Analog photography has a unique aesthetic that many artists want to capture in their work
- Film cameras are expensive and hard to maintain and use without extensive knowledge
- Post-processing techniques involves a lot of manual tuning and usually too simplistic



- Given an input image and a dataset for negatives and print paper, the method simulates the darkroom process to give the output image



## Method



## Related Work

- Stochastic grain simulation [2]
- H&D mapping [1]
- DIR Couplers [3]
- End-to-end physics-based simulation pipeline using LBM fluid simulation [4]

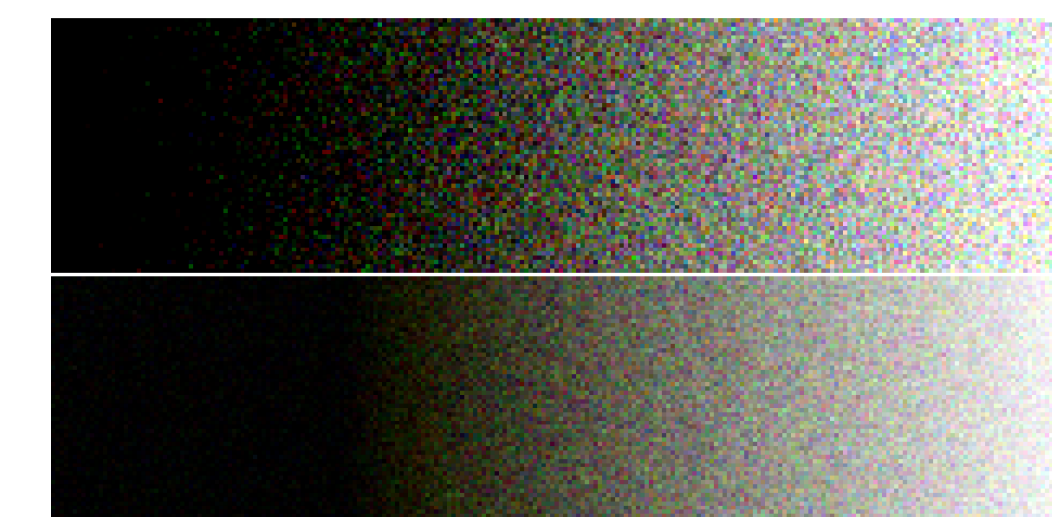
## Experimental Results



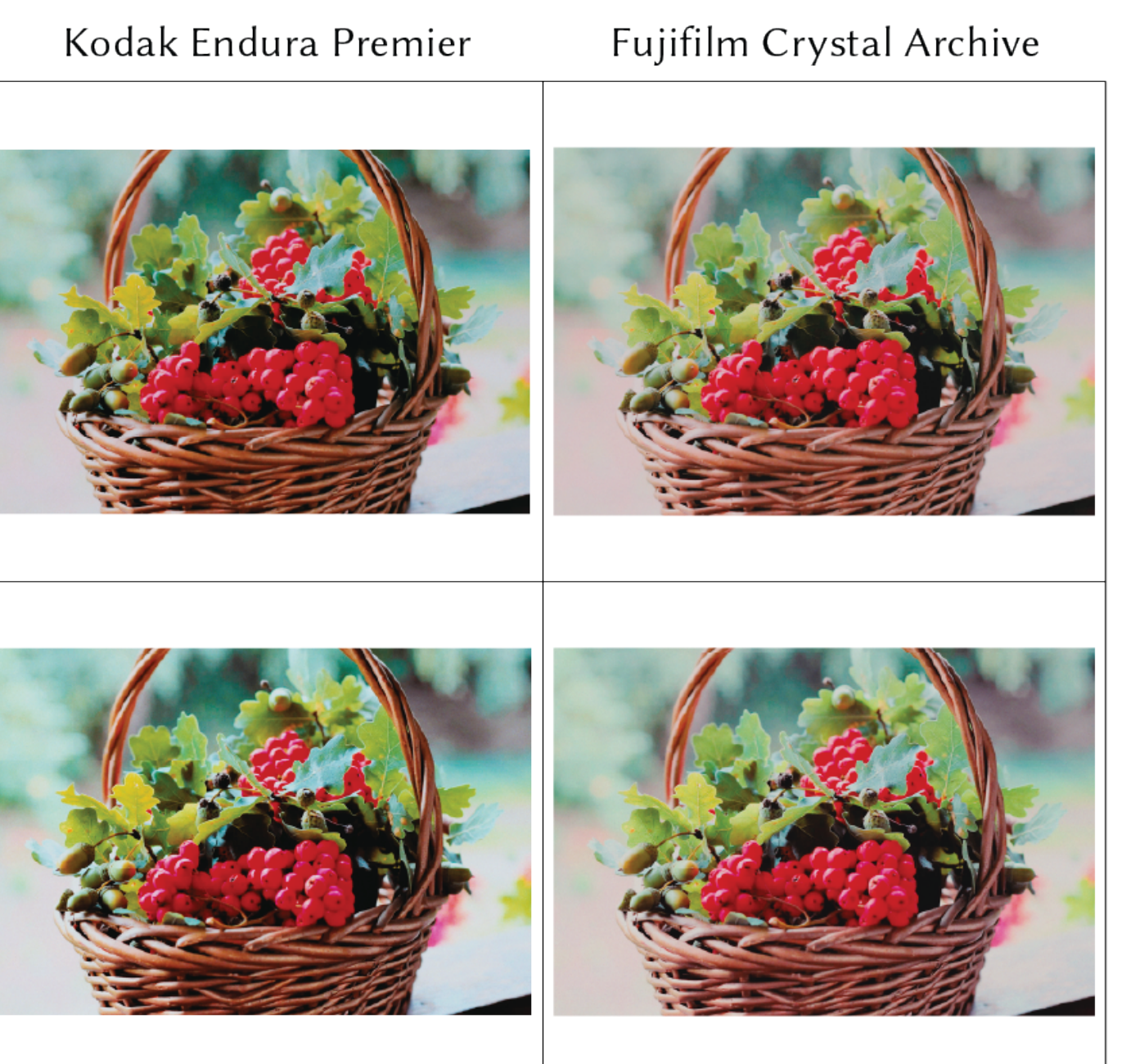
### Effect of DIR Couplers



### Grain Comparison



### Paper



## References

- [1] F. Hurter and V. C. Driffeld, "Photo-chemical investigations and a new method of determination of the sensitiveness of photographic plates," *Journal of the Society of Chemical Industry*, vol. 9, pp. 455–469, 1890
- [2] A. Newson, N. Faraj, J. Delon, and B. Galerne, "Realistic film grain rendering," *Image Processing On Line*, vol. 7, pp. 165–183, 2017.
- [3] C. A. Porter and G. Spitteler, "Development-inhibitor-releasing (DIR) couplers in photography," *Photographic Science and Engineering*, vol. 13, no. 2, pp. 74–81, 1969.
- [4] J. I. Echevarria, G. Wilensky, A. Krishnaswamy, B. Kim, and D. Gutierrez, "Computational simulation of alternative photographic processes," *Computer Graphics Forum*, vol. 32, no. 4, pp. 7–16, 201