

多基色显示系统的颜色品质与颜色管理

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Color Research & Application 主编

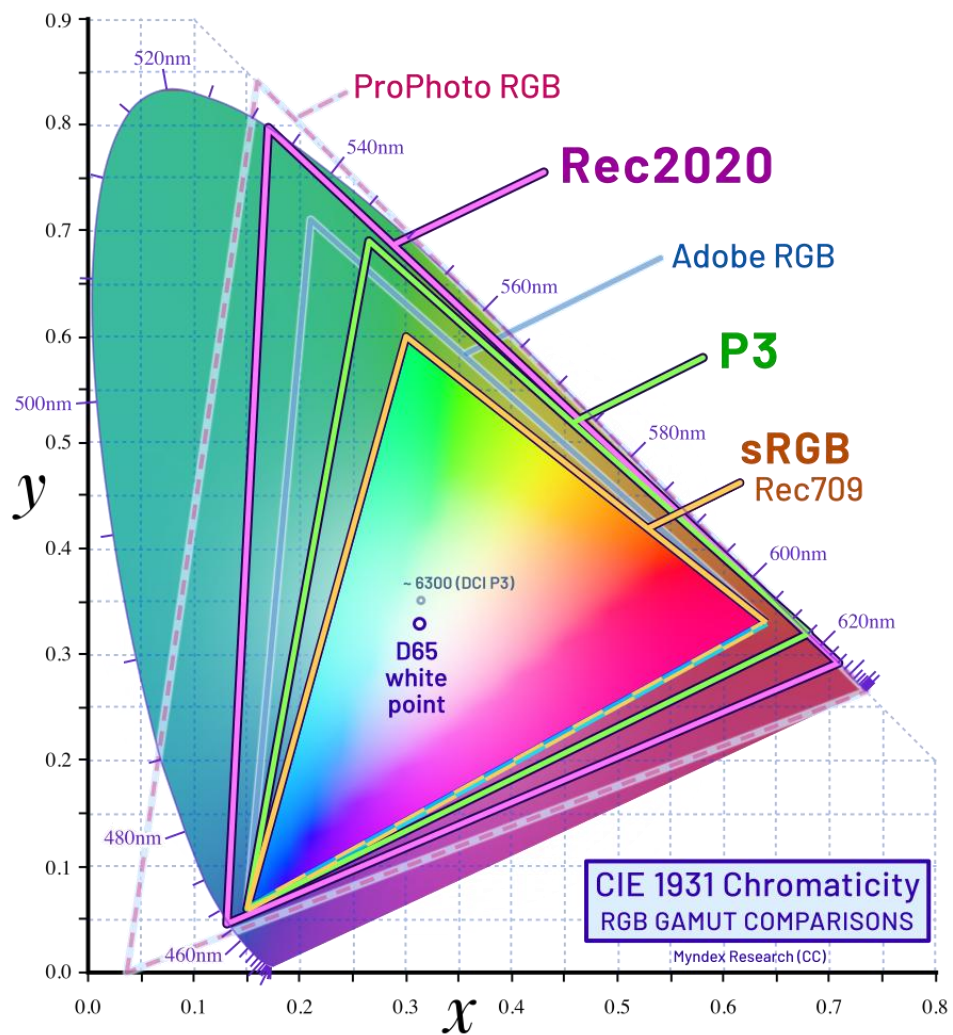
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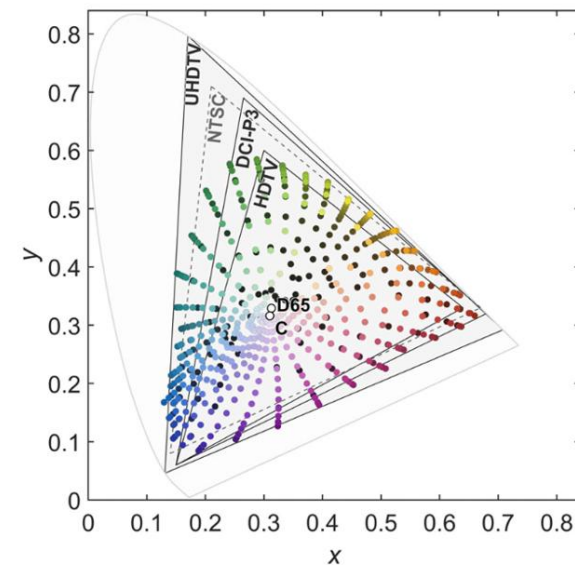
Content

- 从内容的角度，需不需要广色域/多基色？
- 多基色的收益：同色异谱
- 多基色的挑战：颜色管理

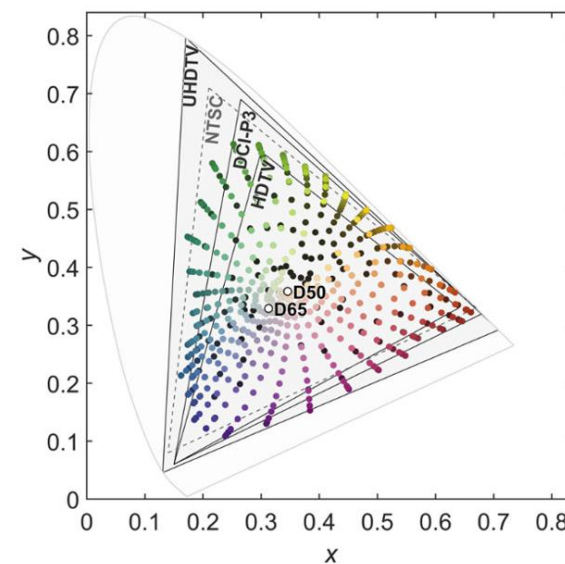
我们需不需要广色域？



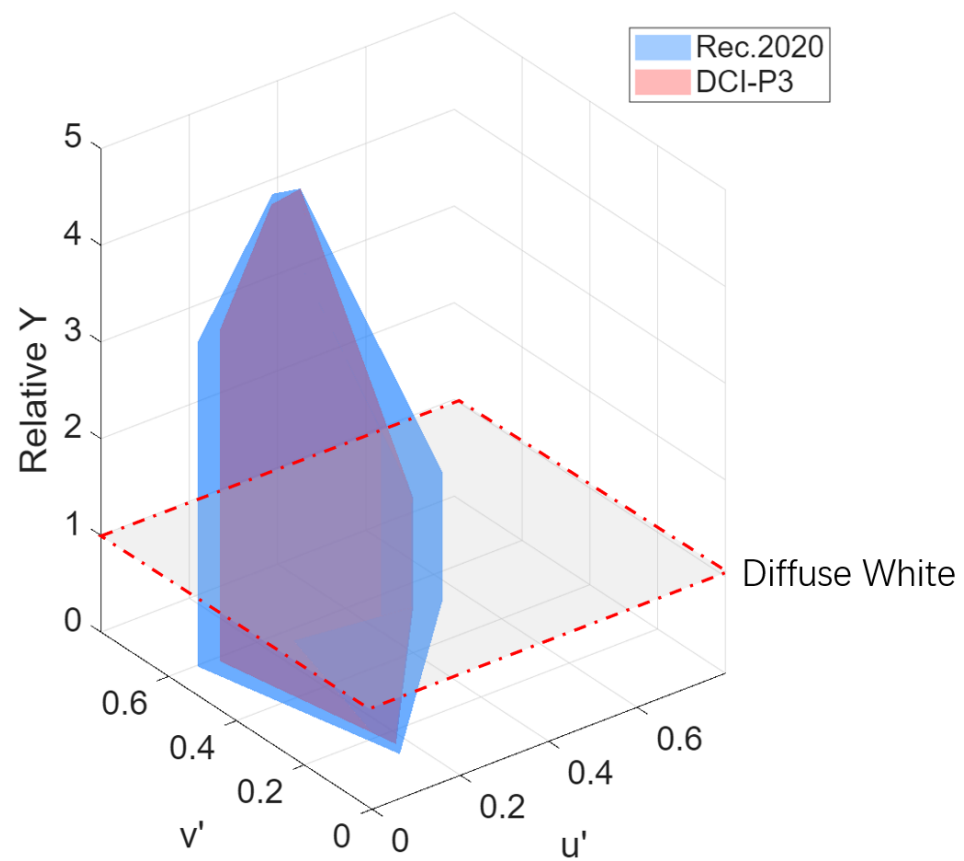
Pointer's Gamut



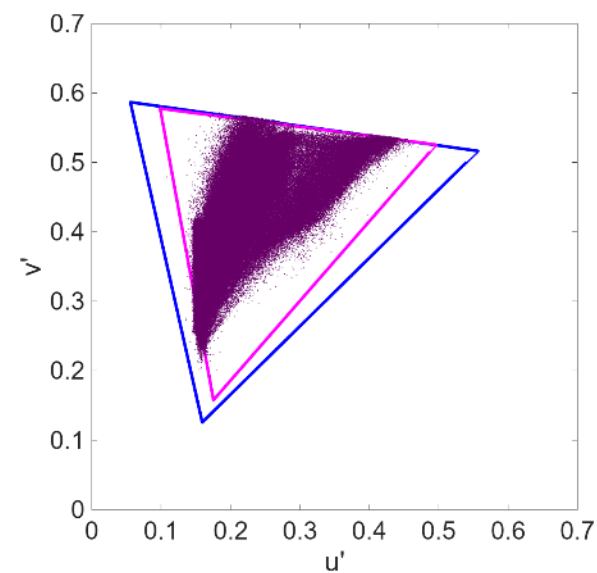
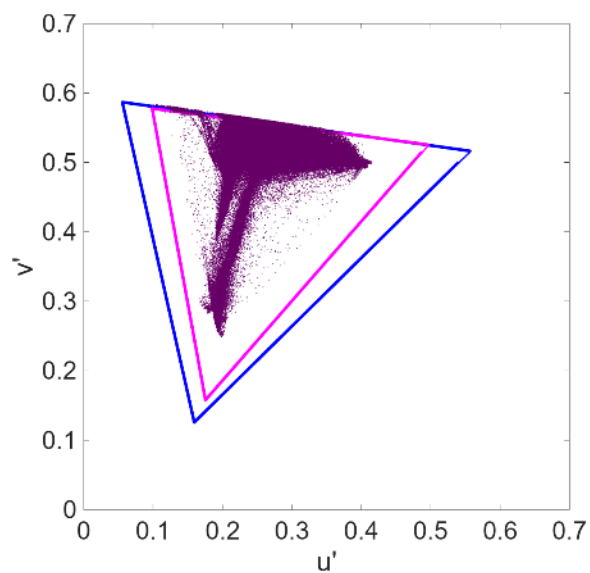
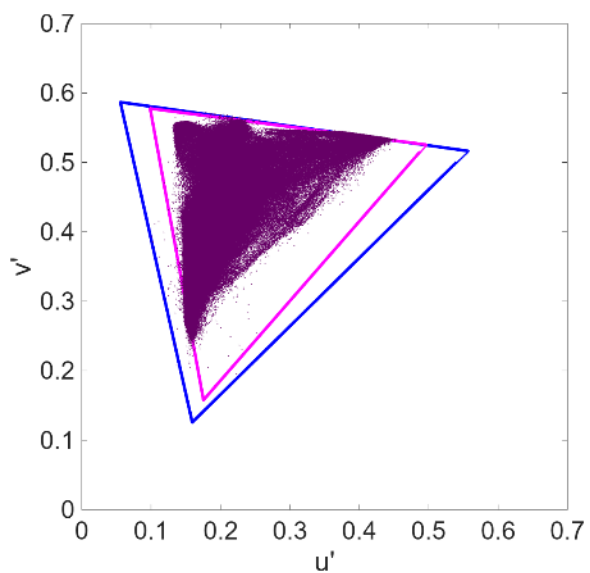
ISO12640-3 Gamut



色域不是2D而是3D



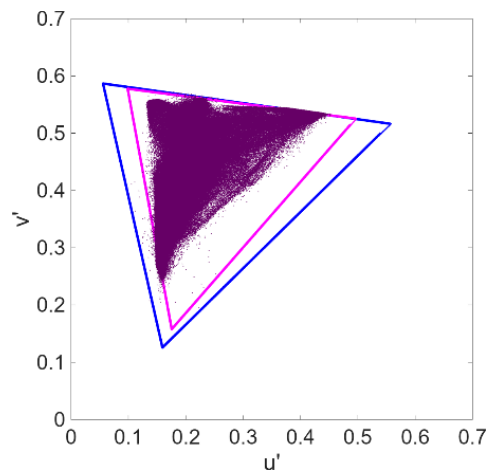
色域不是2D而是3D



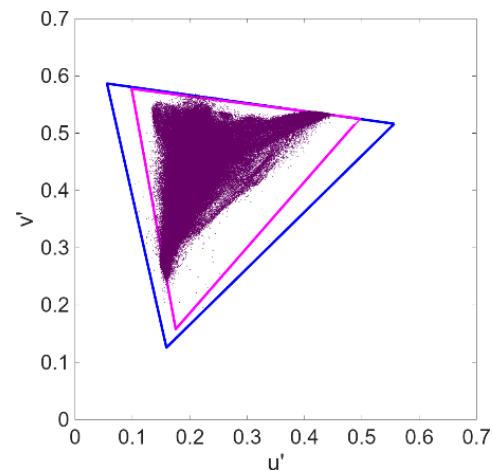
色域不是2D而是3D



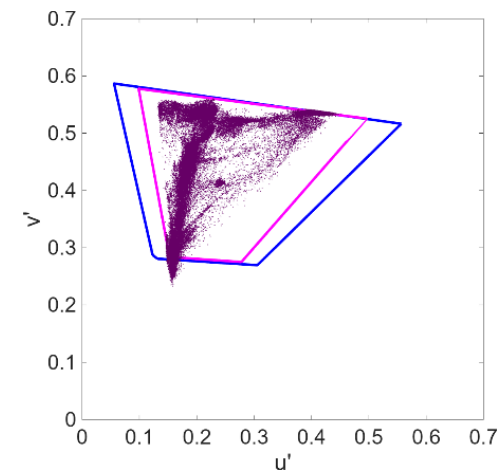
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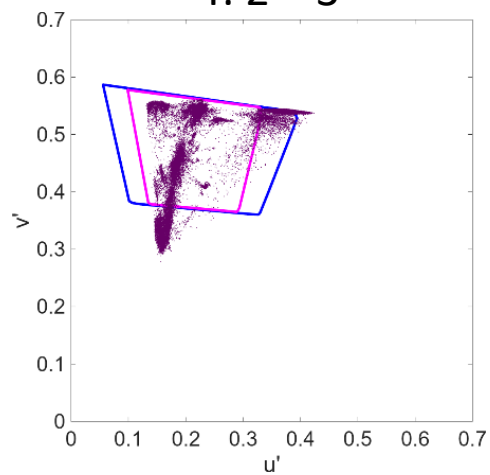
Y: 0.01 – 1



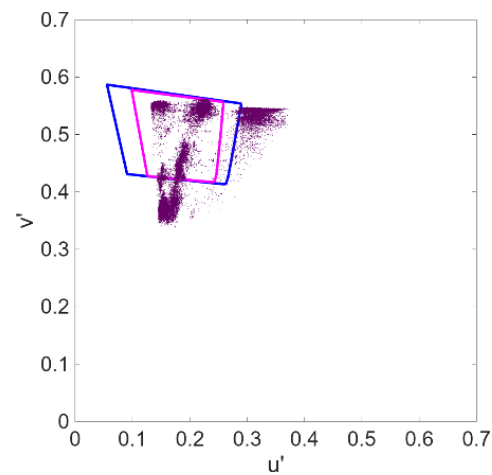
Y: 1 – 2



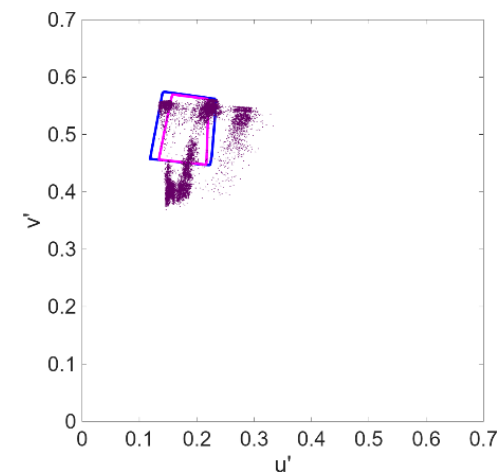
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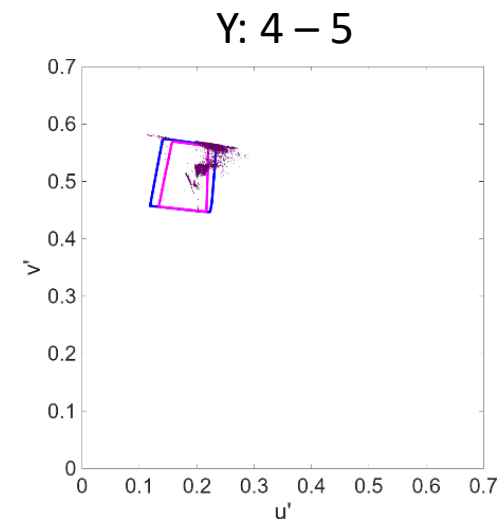
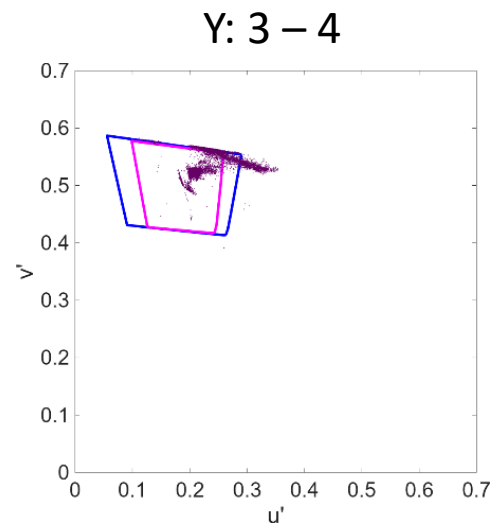
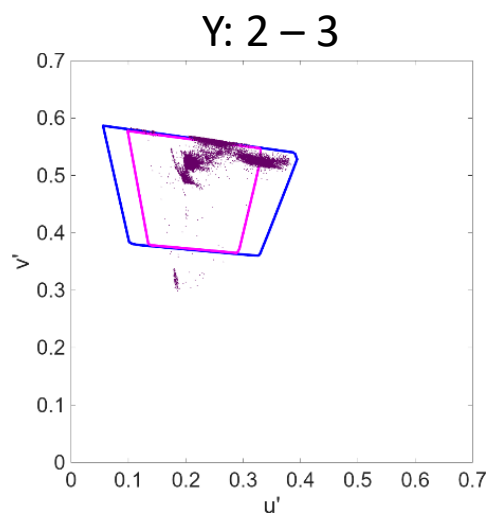
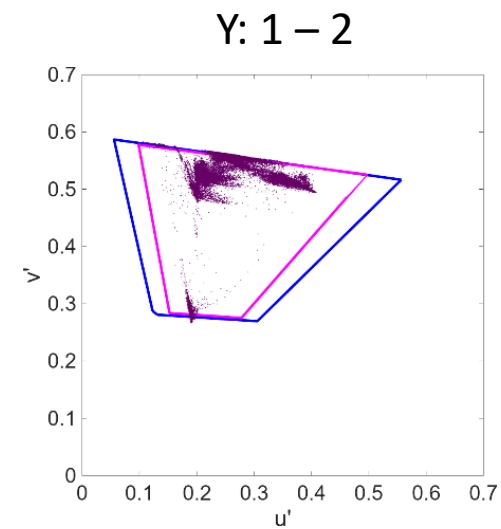
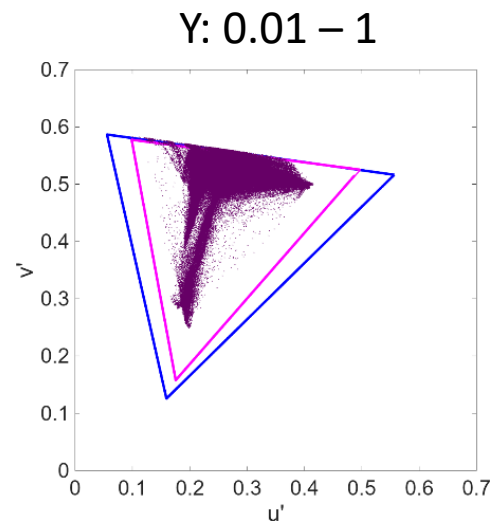
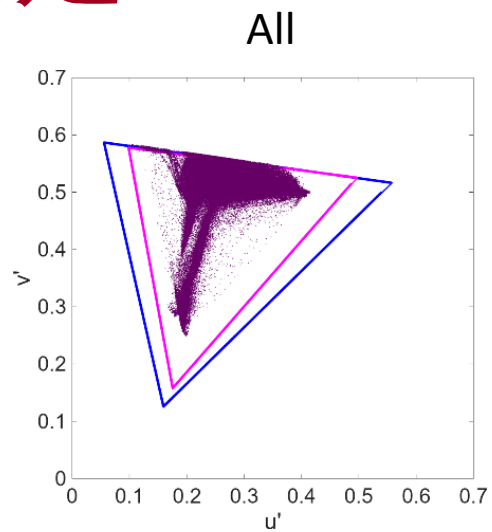
Y: 3 – 4



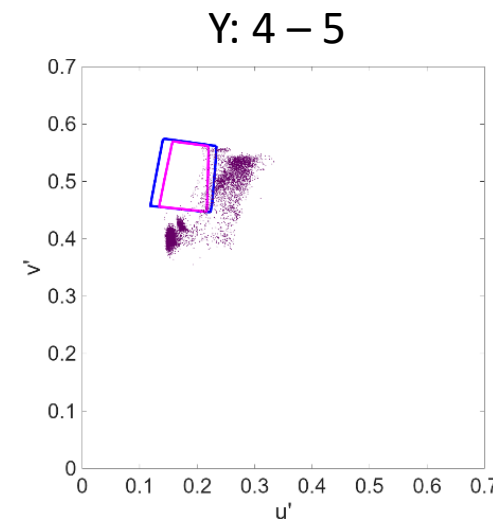
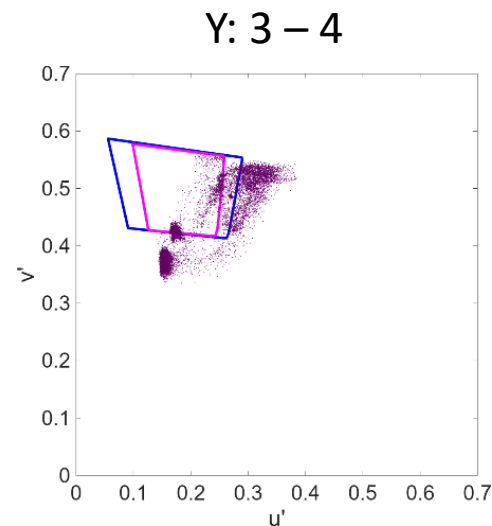
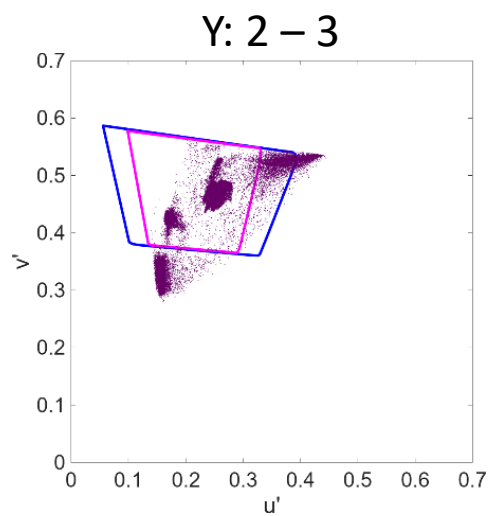
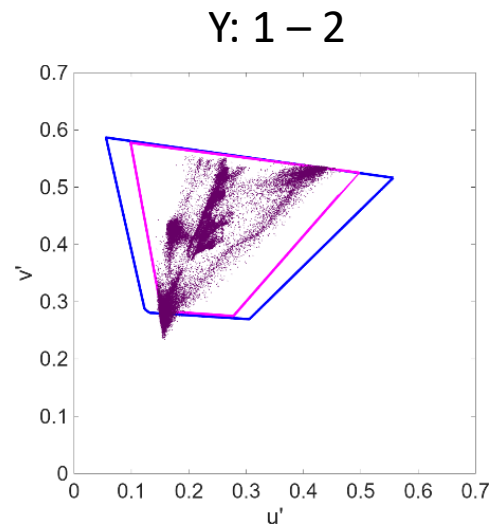
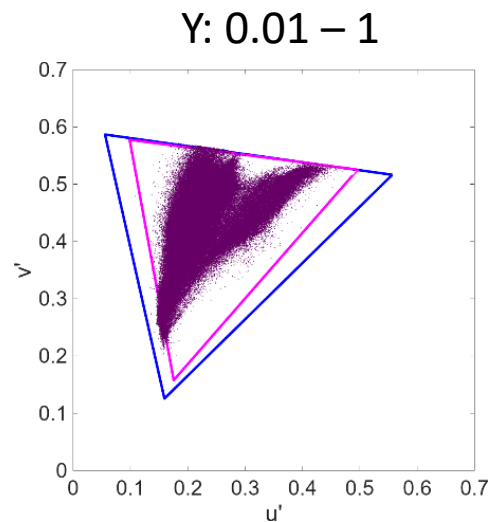
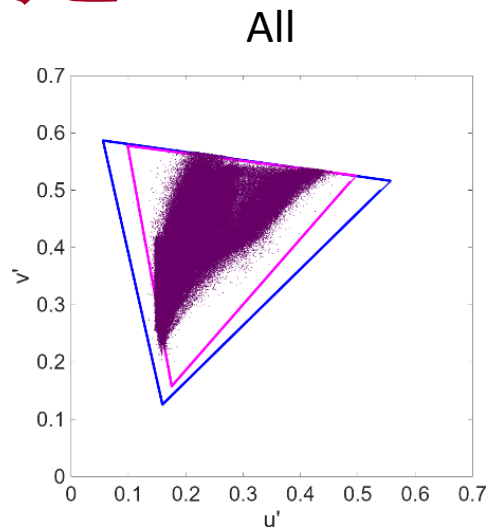
Y: 4 – 5



色域不是2D而是3D



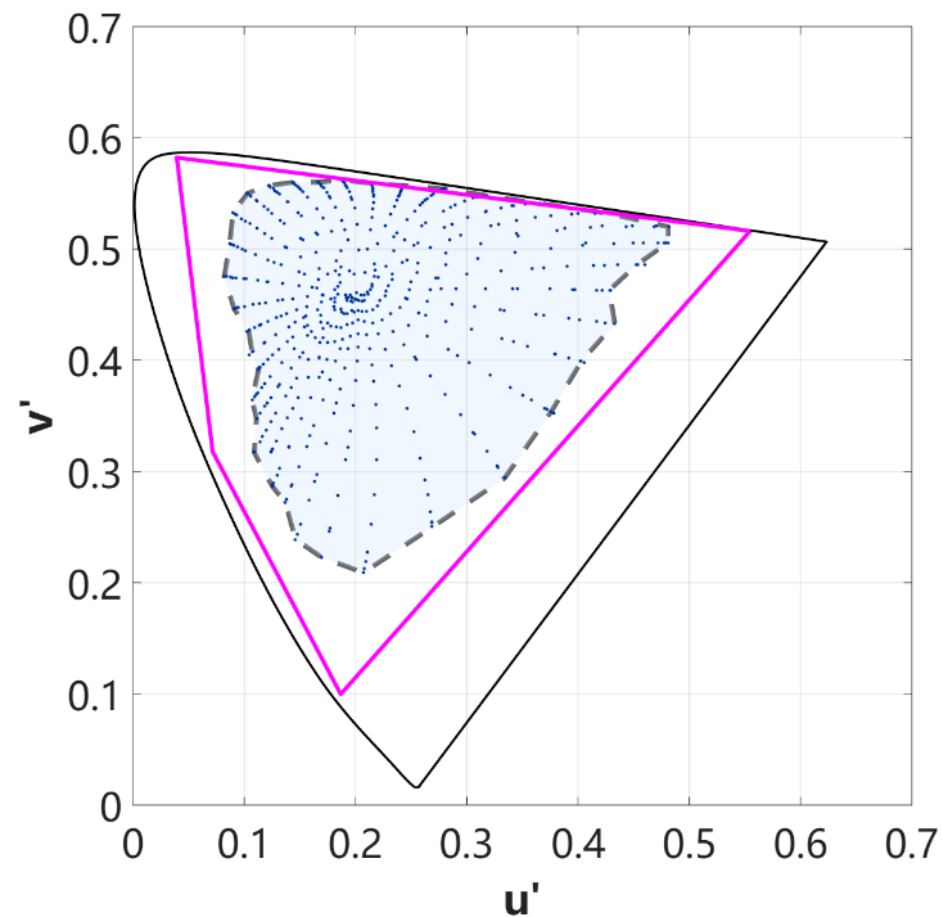
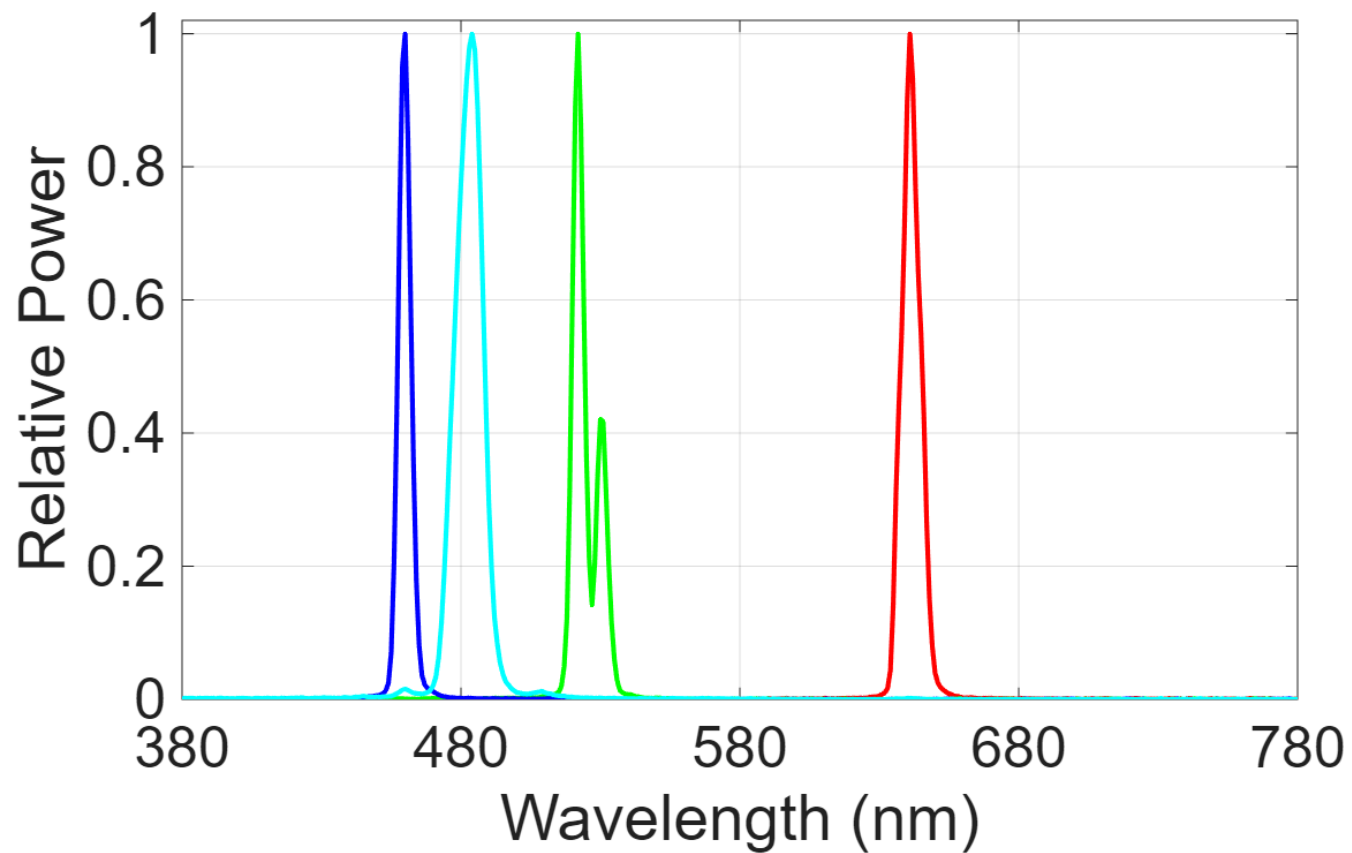
色域不是2D而是3D



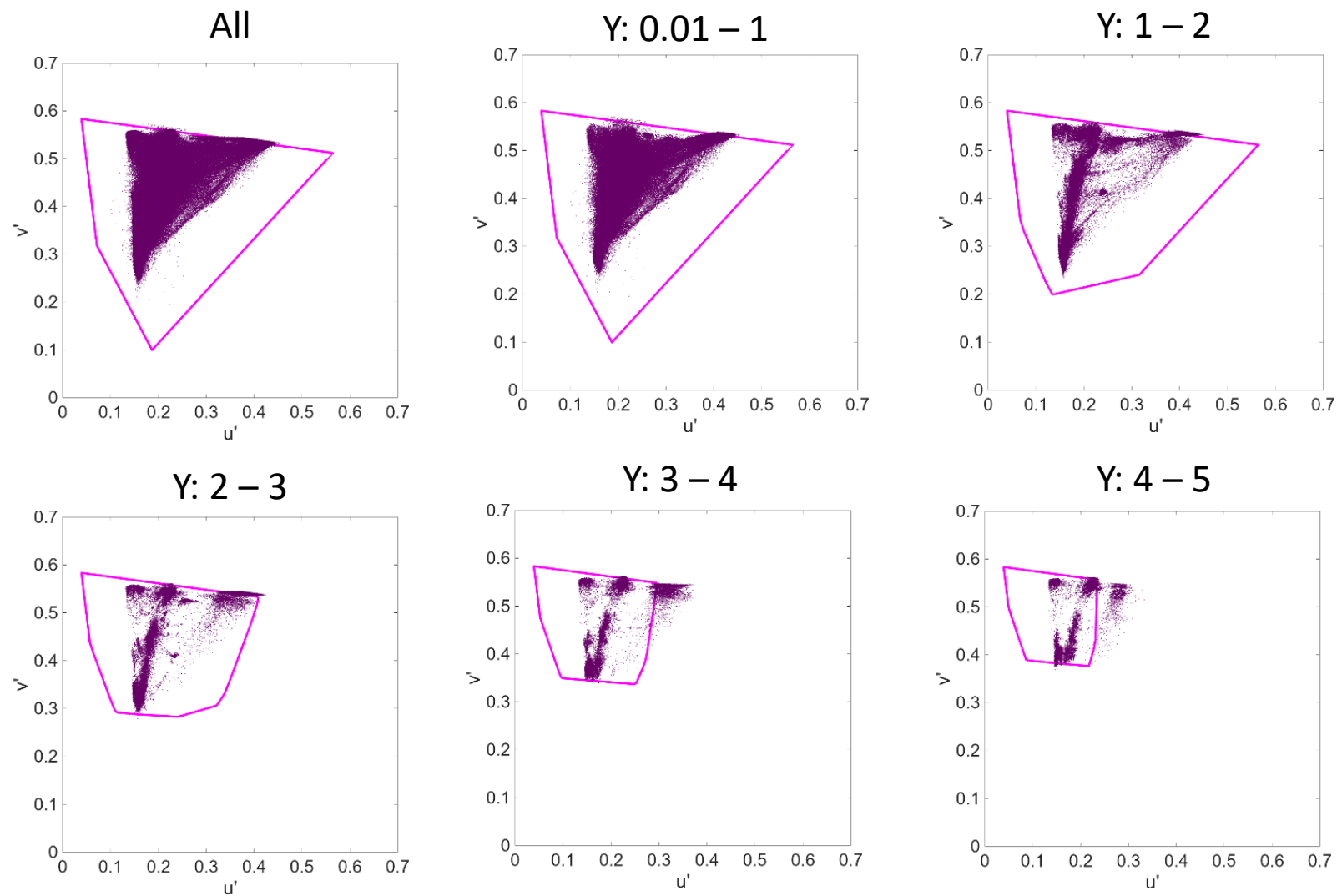
结论:

- 色域是3D, Rec 2020的收益明显
- 似乎Rec2020还不够

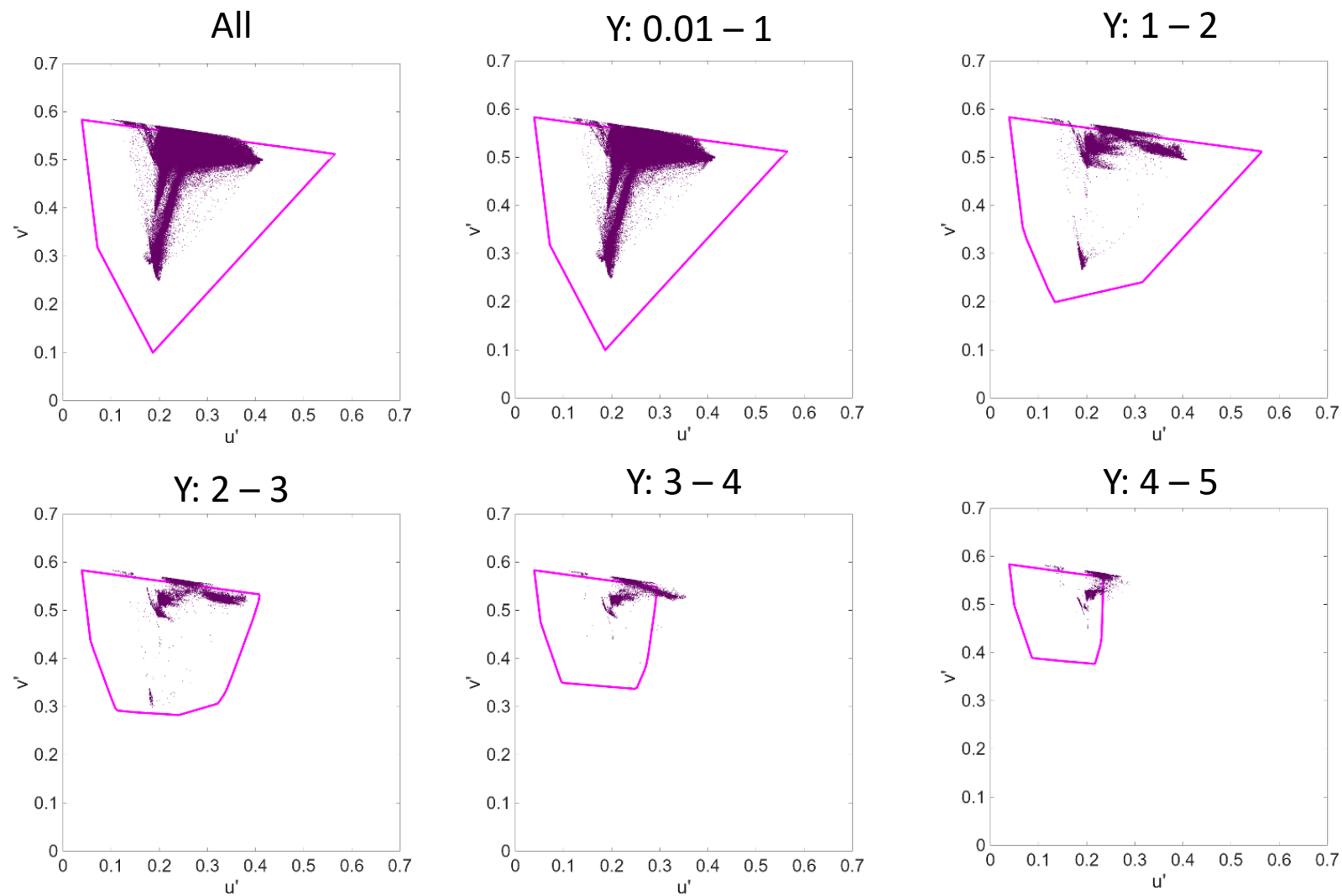
自行搭建的四基色系统



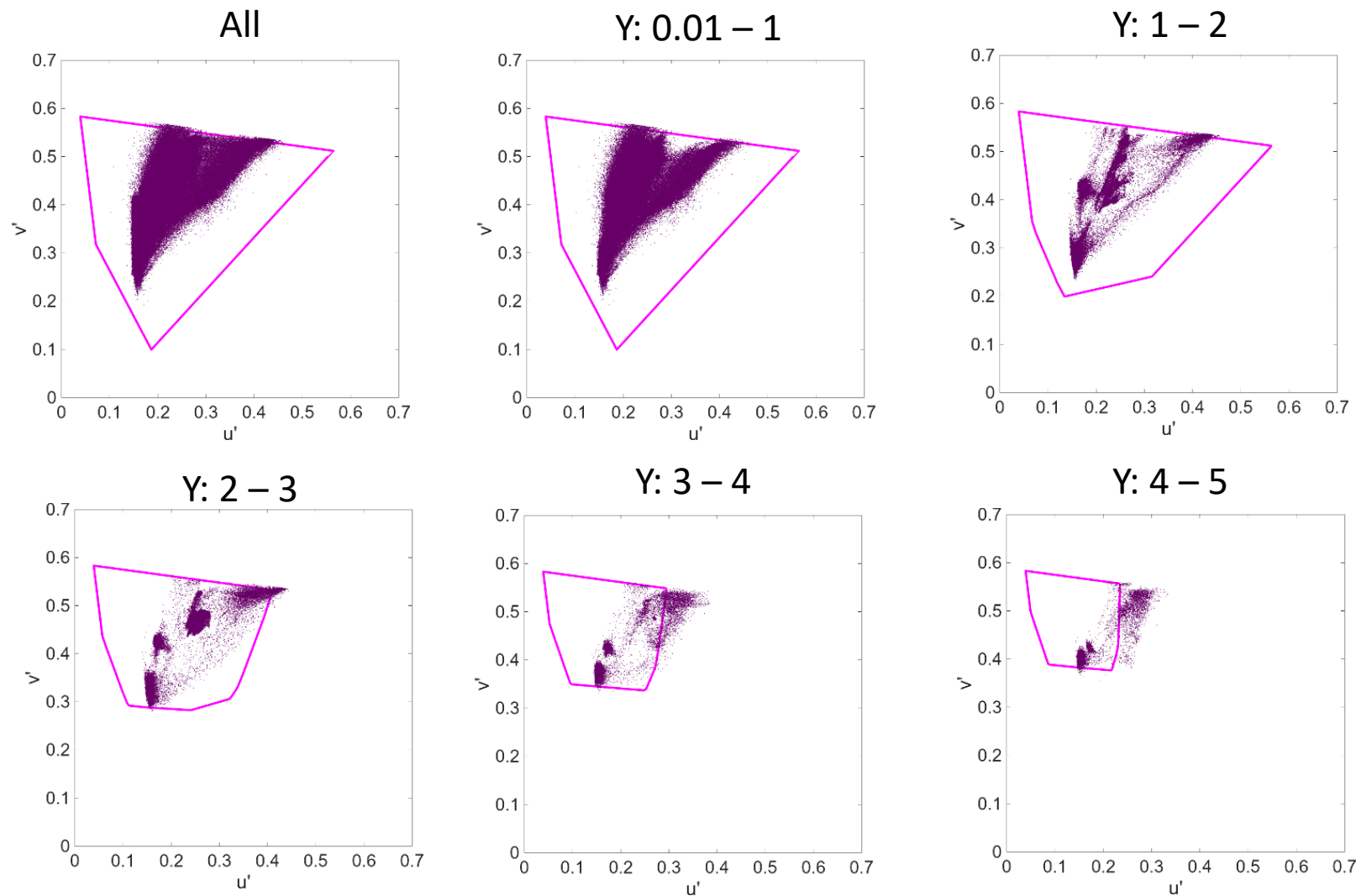
四基色的收益



四基色的收益



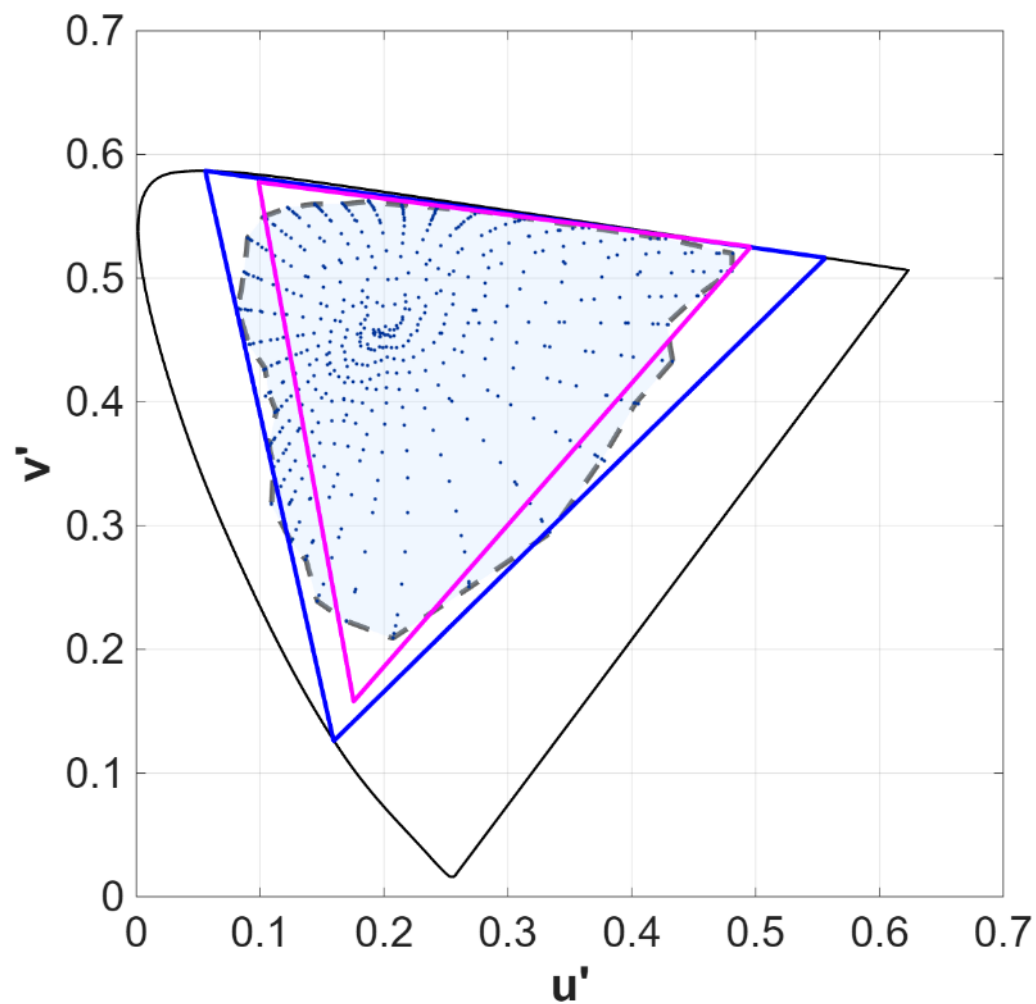
四基色的收益



结论:

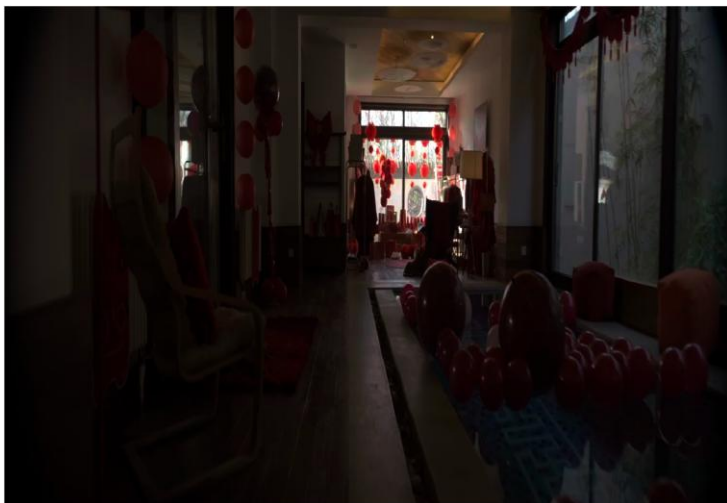
- 自发光的内容是需要Rec2020/四基色

是不是反射的物体就不用？



色域不是2D而是3D

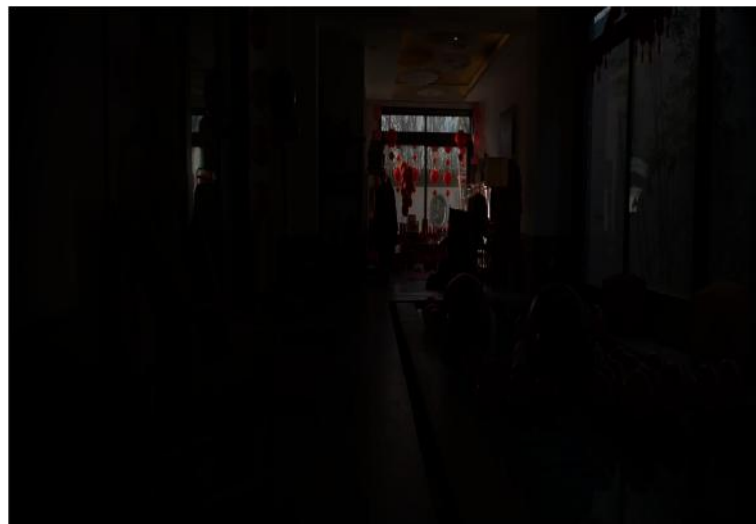
原片



模拟手机在室内拍摄



模拟手机在室外拍摄

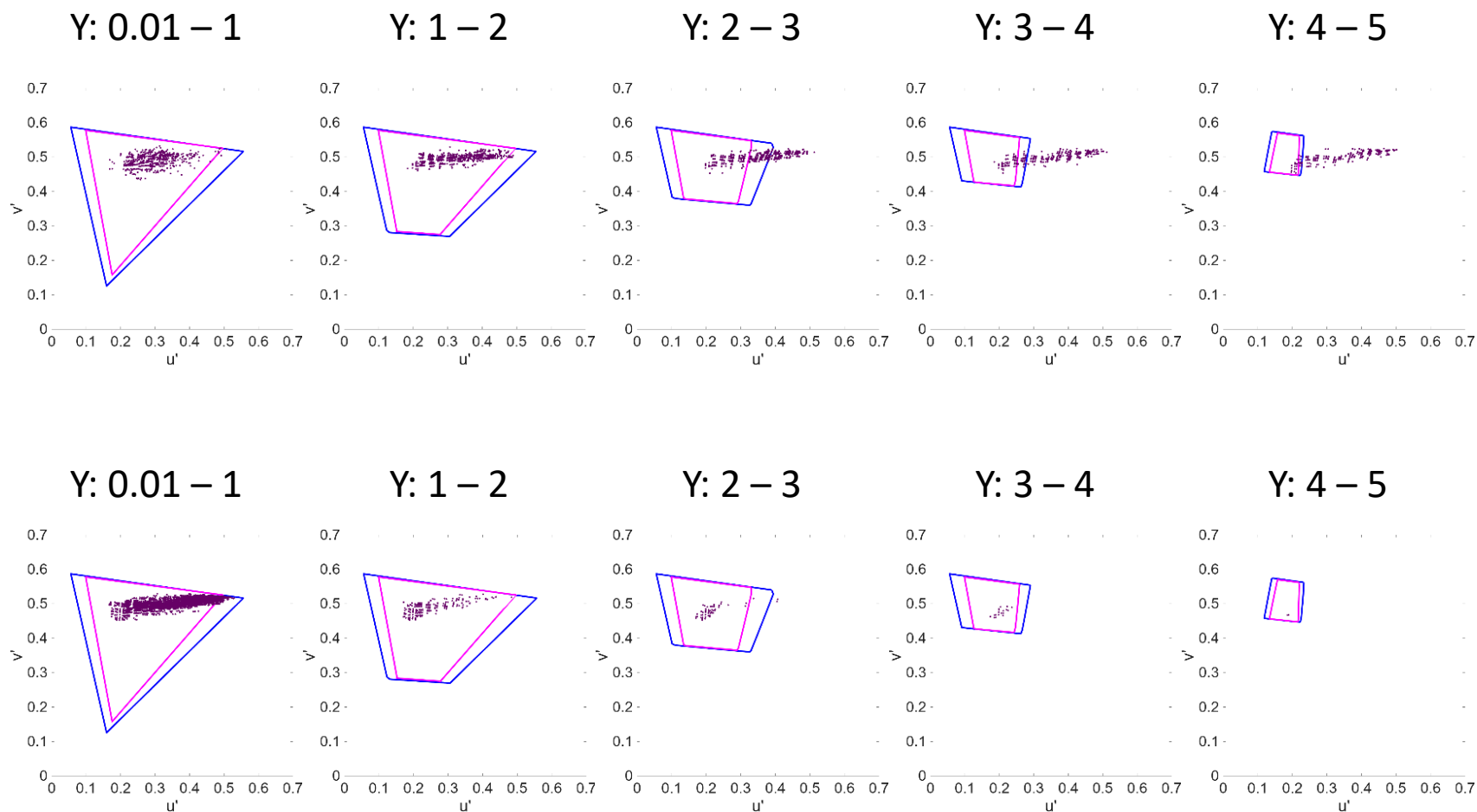


色域不是2D而是3D: P3 & Rec 2020

模拟手机在室内拍摄

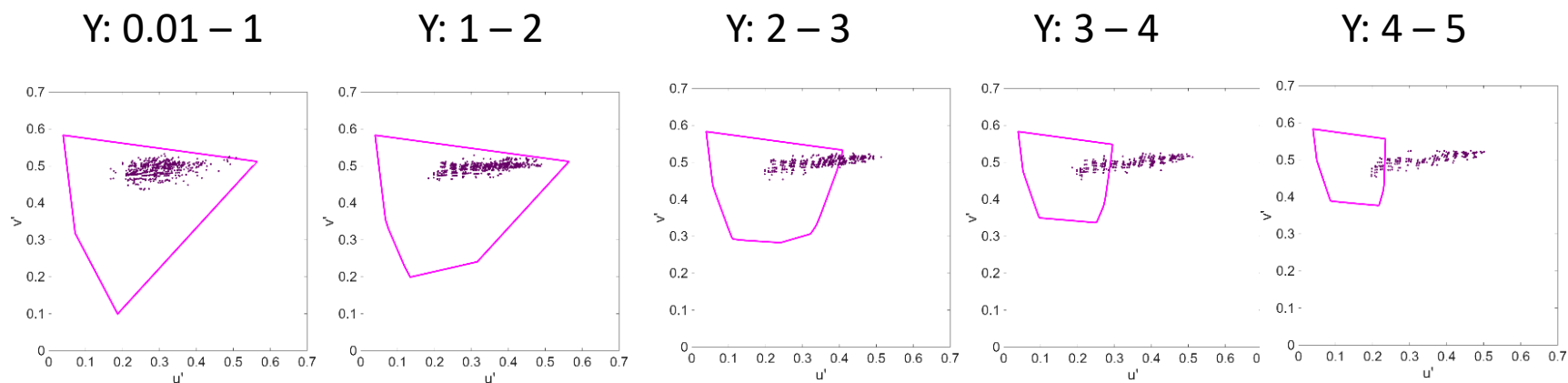


模拟手机在室外拍摄

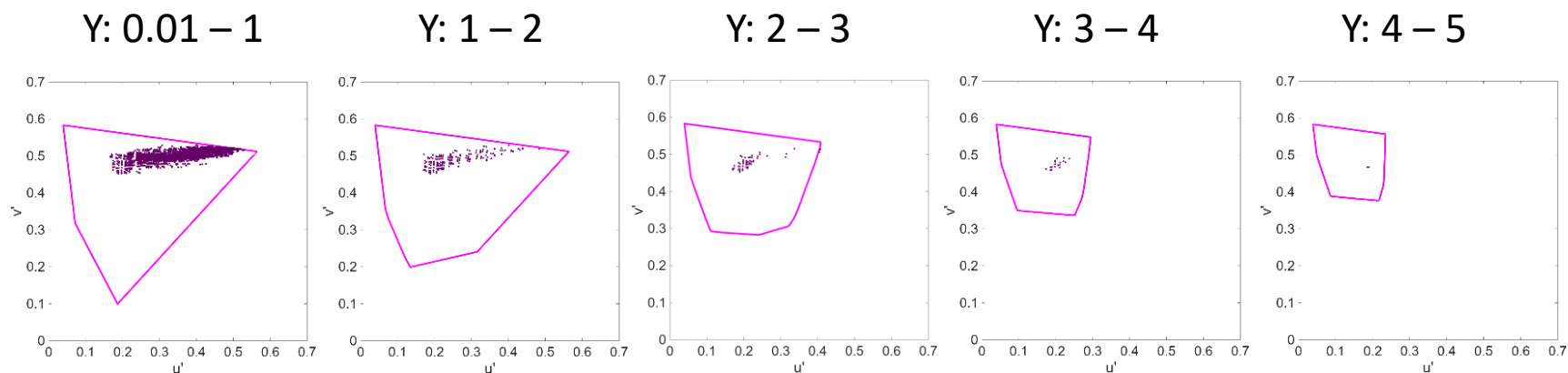


色域不是2D而是3D：四基色

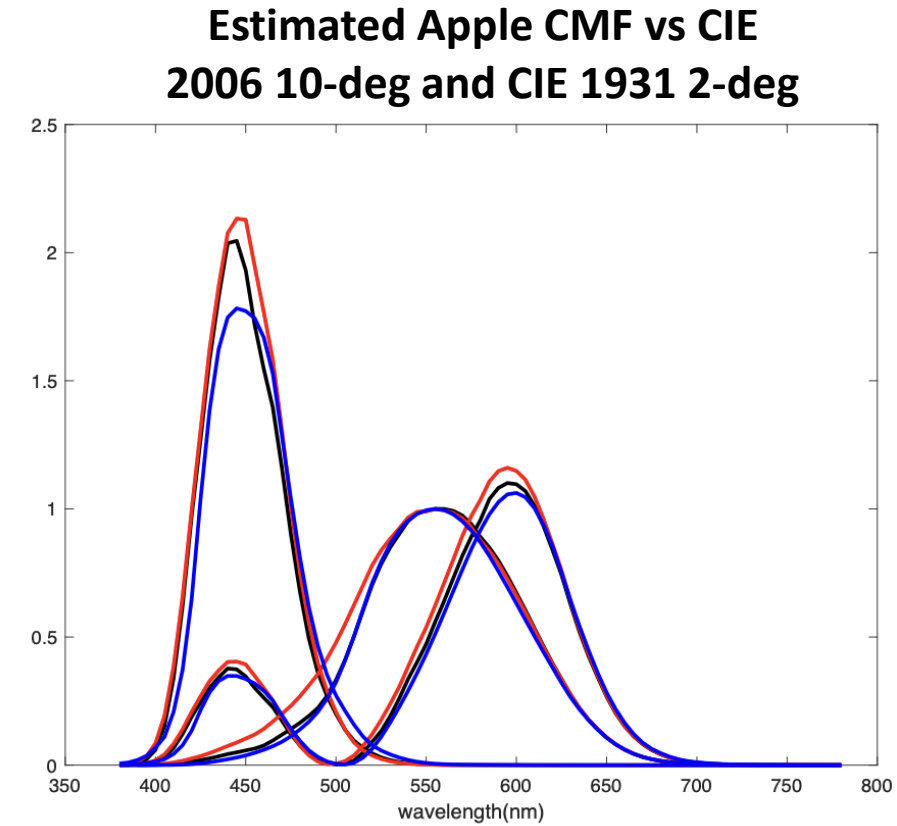
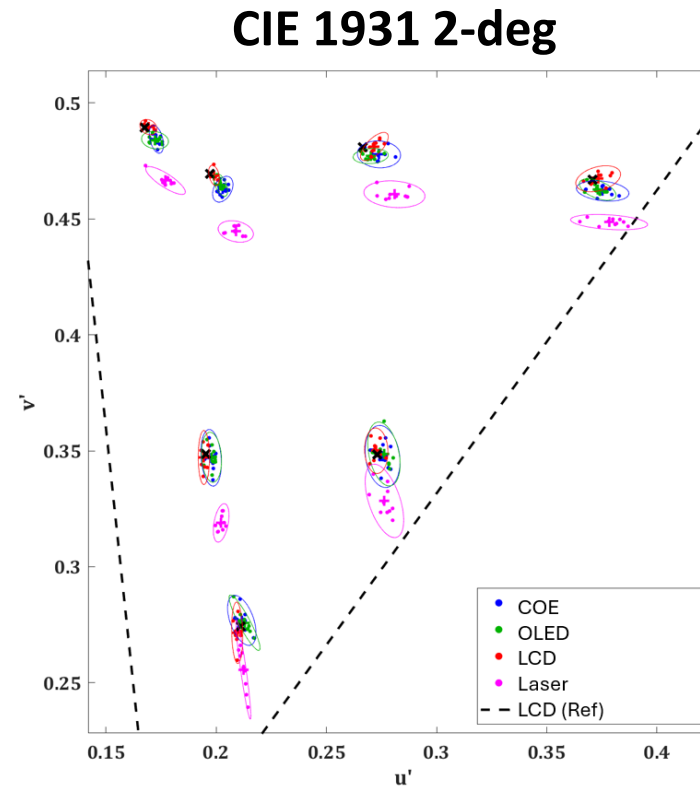
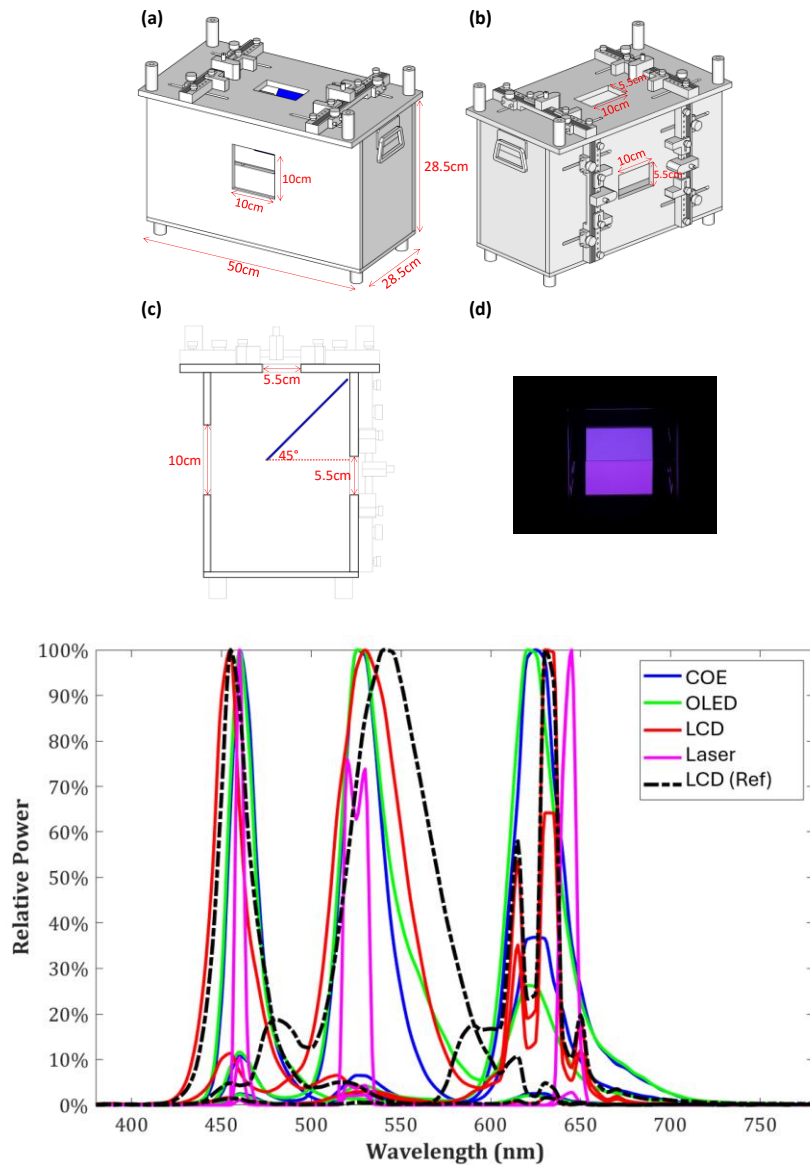
模拟手机在室内拍摄



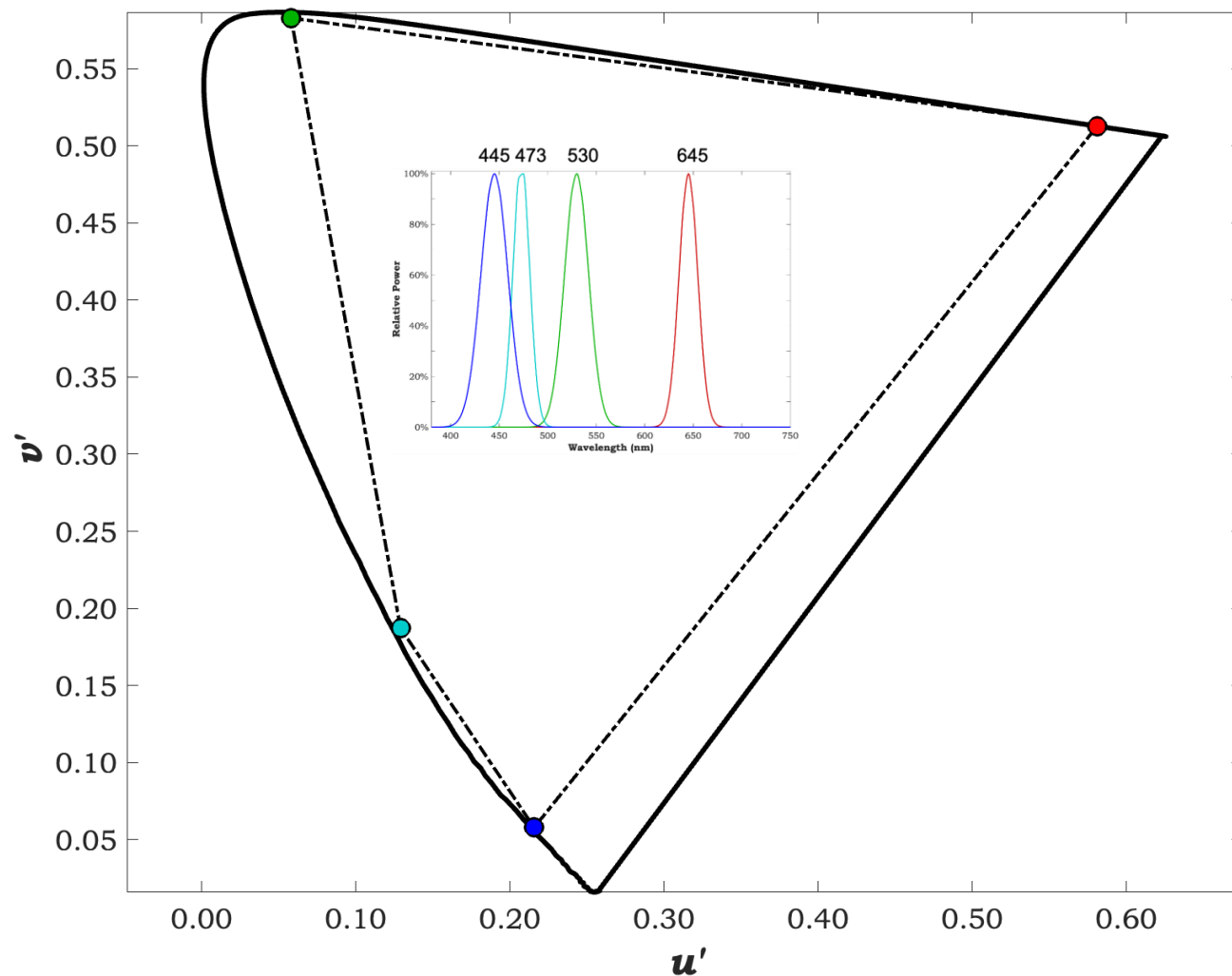
模拟手机在室外拍摄



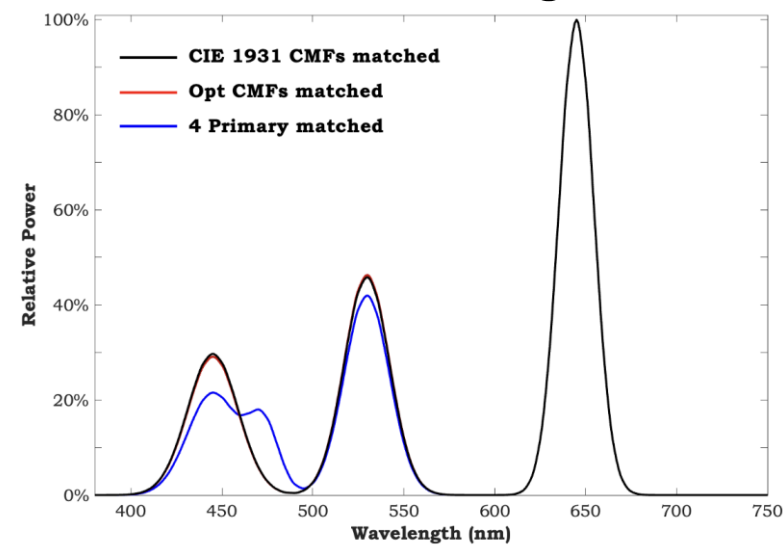
四基色 vs 三基色Rec2020



四基色能否降低同色异谱？



SPD for matching D65

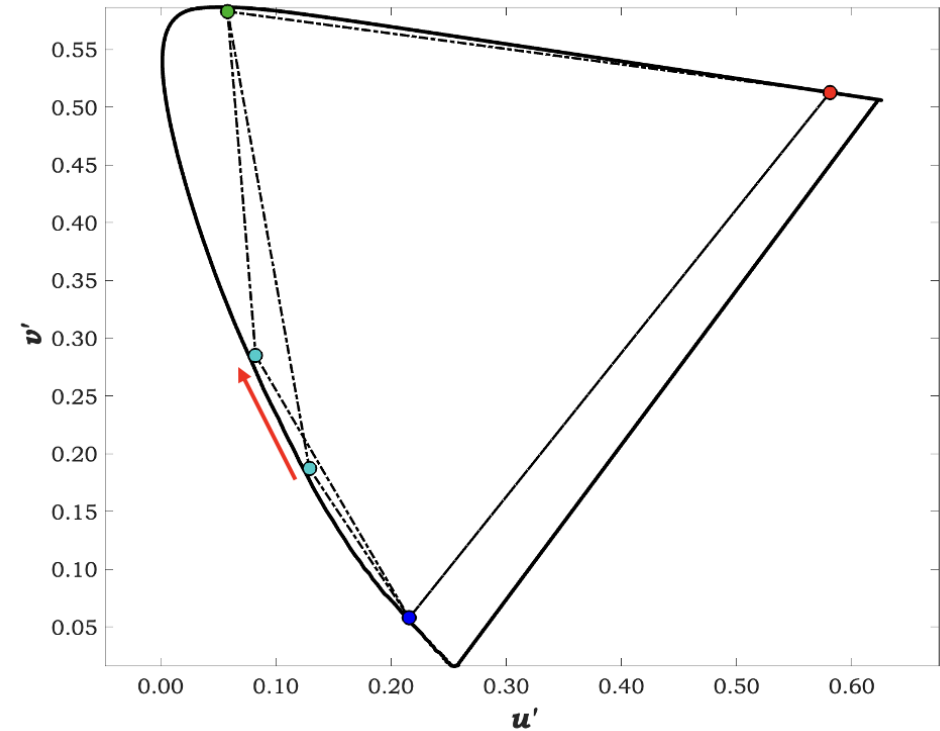
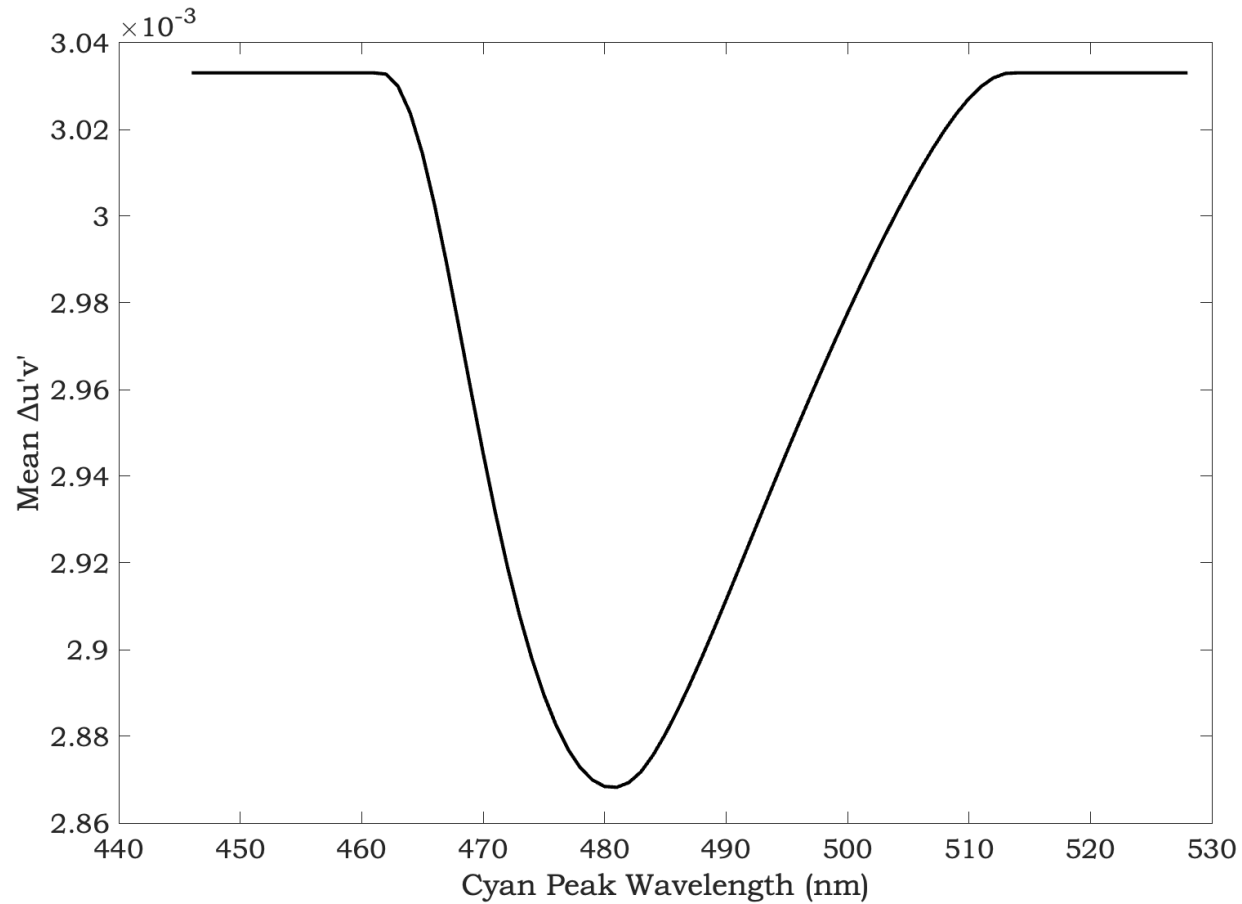


Average difference perceived by 60 observers

	Mean $\Delta u'v'$ of 60 Obs
3 Primary CIE 1931 CMFs matched	0.00448
3 Primary Opt CMFs matched	0.00334
4 Primary matched	0.00291

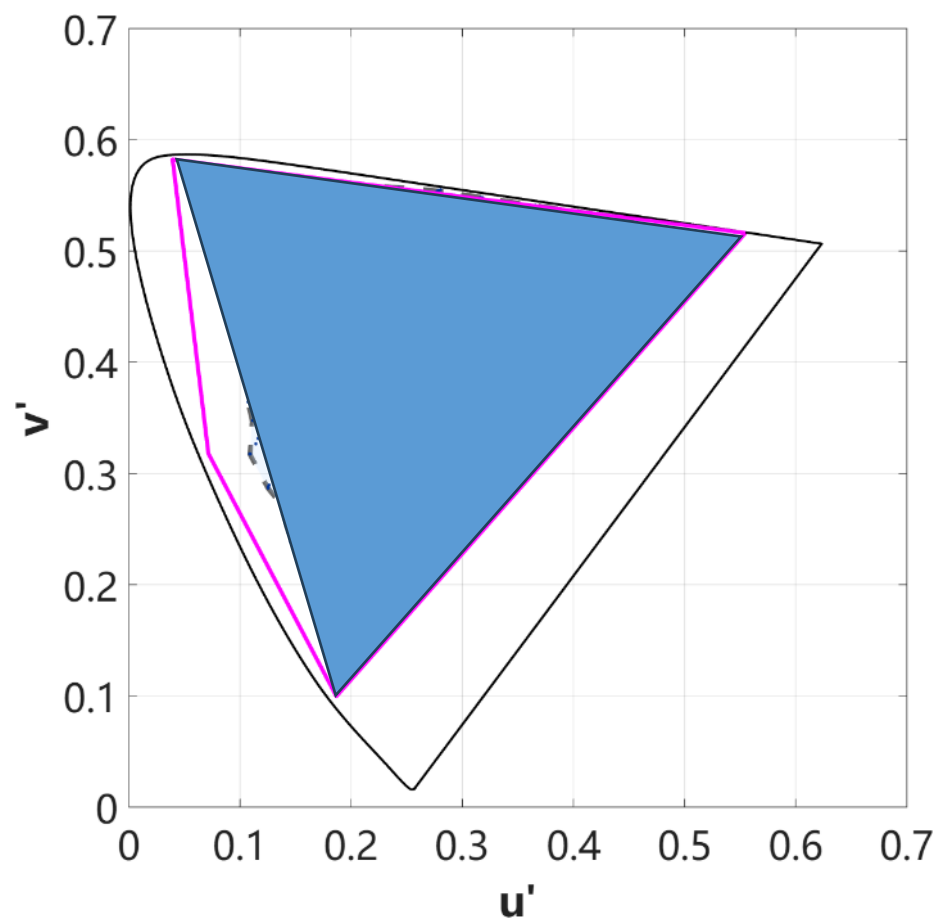
四基色能否降低同色异谱？

Optimizing peak for the 4th primary

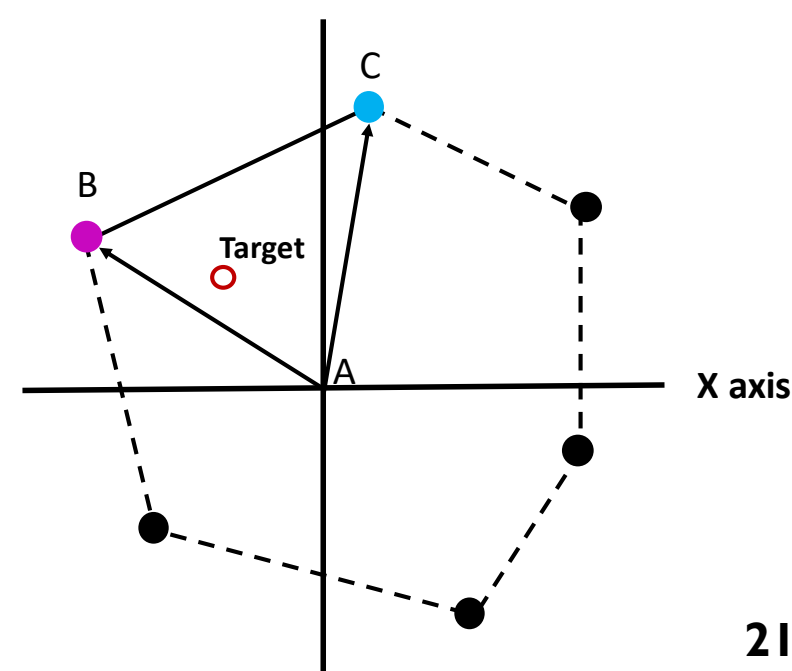
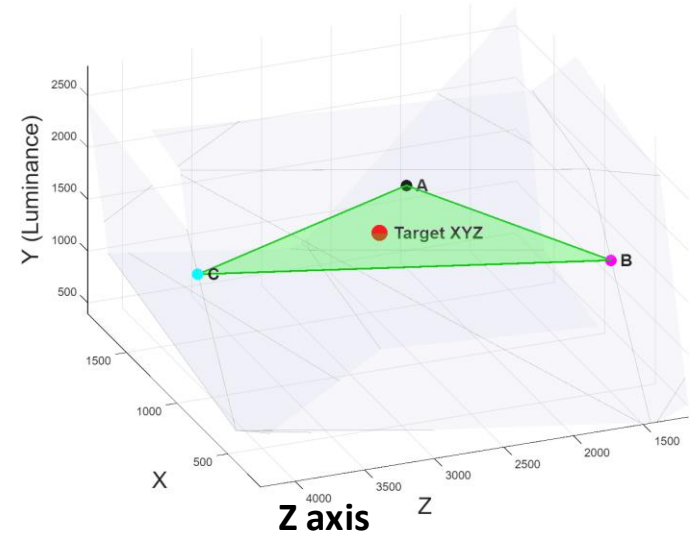
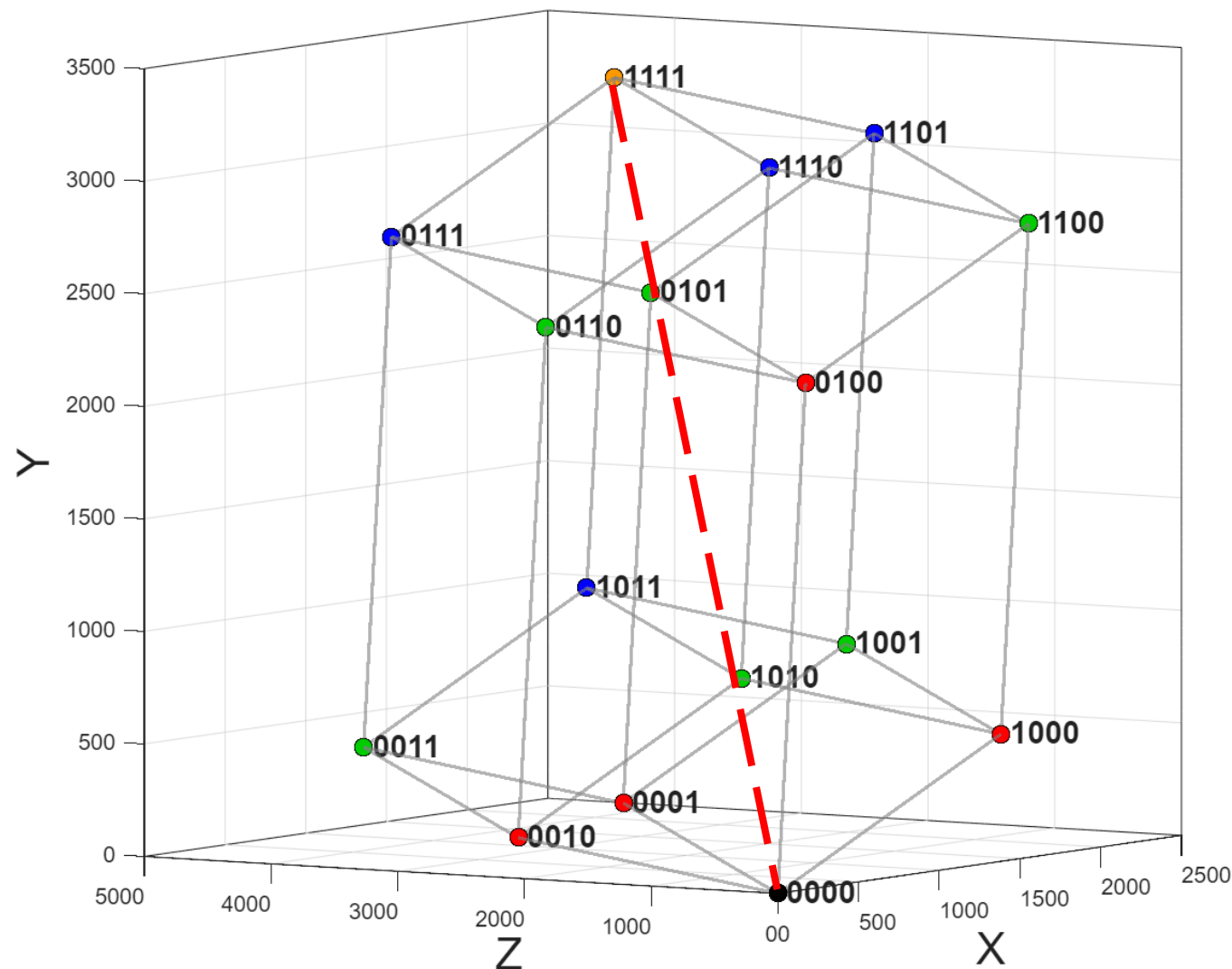


四基色的挑战：颜色管理

- 三基色：唯一解
- 四基色：无数解
 - Rec2020范围内用三基色，超出用4基色？
 - 新的四基色颜色管理

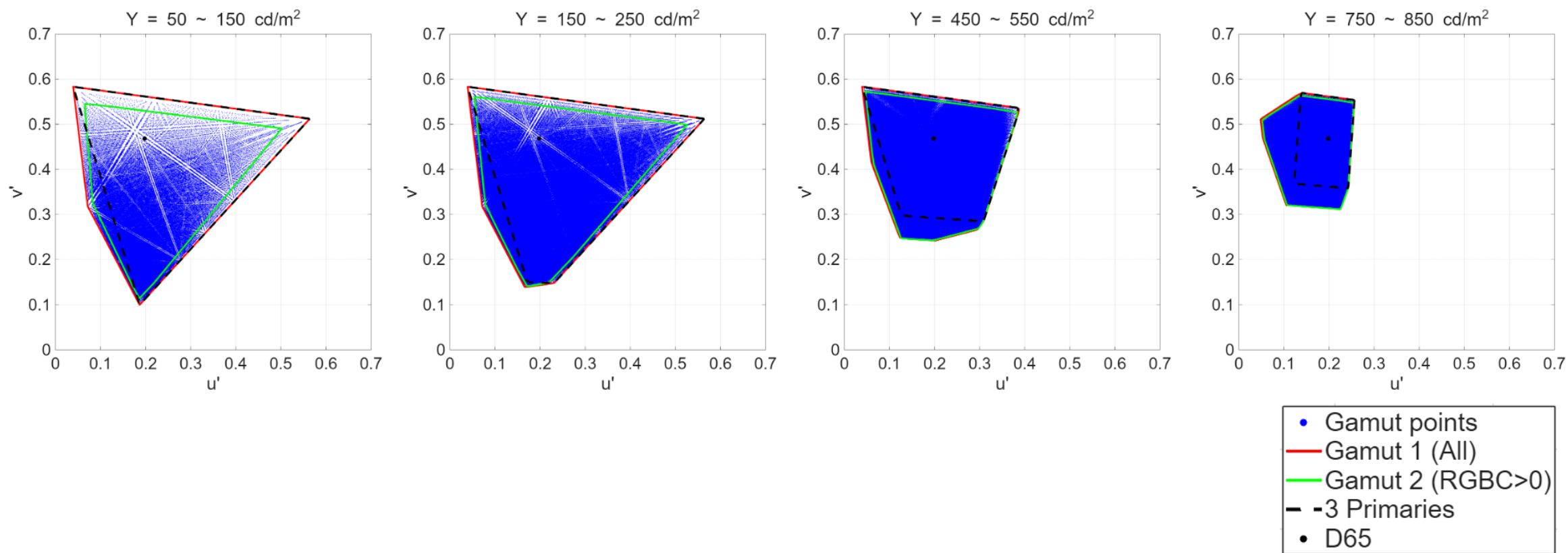


一种新的四基色颜色管理方案：最大化同色异谱的收益



一种新的四基色颜色管理方案：最大化同色异谱的收益

• 最大化采用四基色



总结

- 我们需要广色域（Rec 2020、四基色）
- 色域是3D而不是2D，高亮刺激、自发光刺激都需要广色域
- 四基色可以有效降低同色异谱效应
- 四基色需要新的颜色管理方案
- 还需要关注其他显示效果，例如subpixel的影响

Thank you!

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