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Unifying the refocusing algorithms and parameterizations for traditional and focused plenoptic cameras

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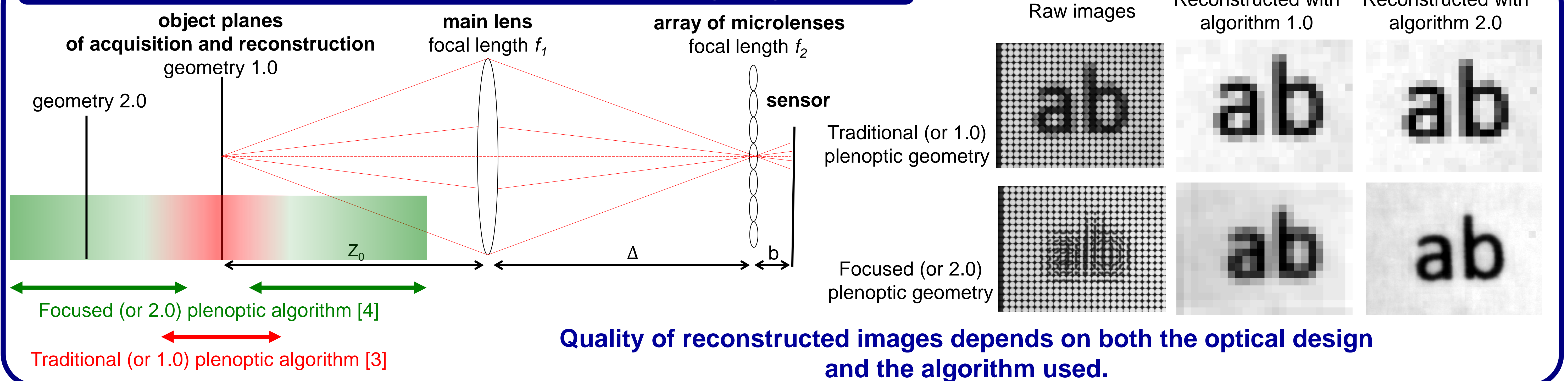
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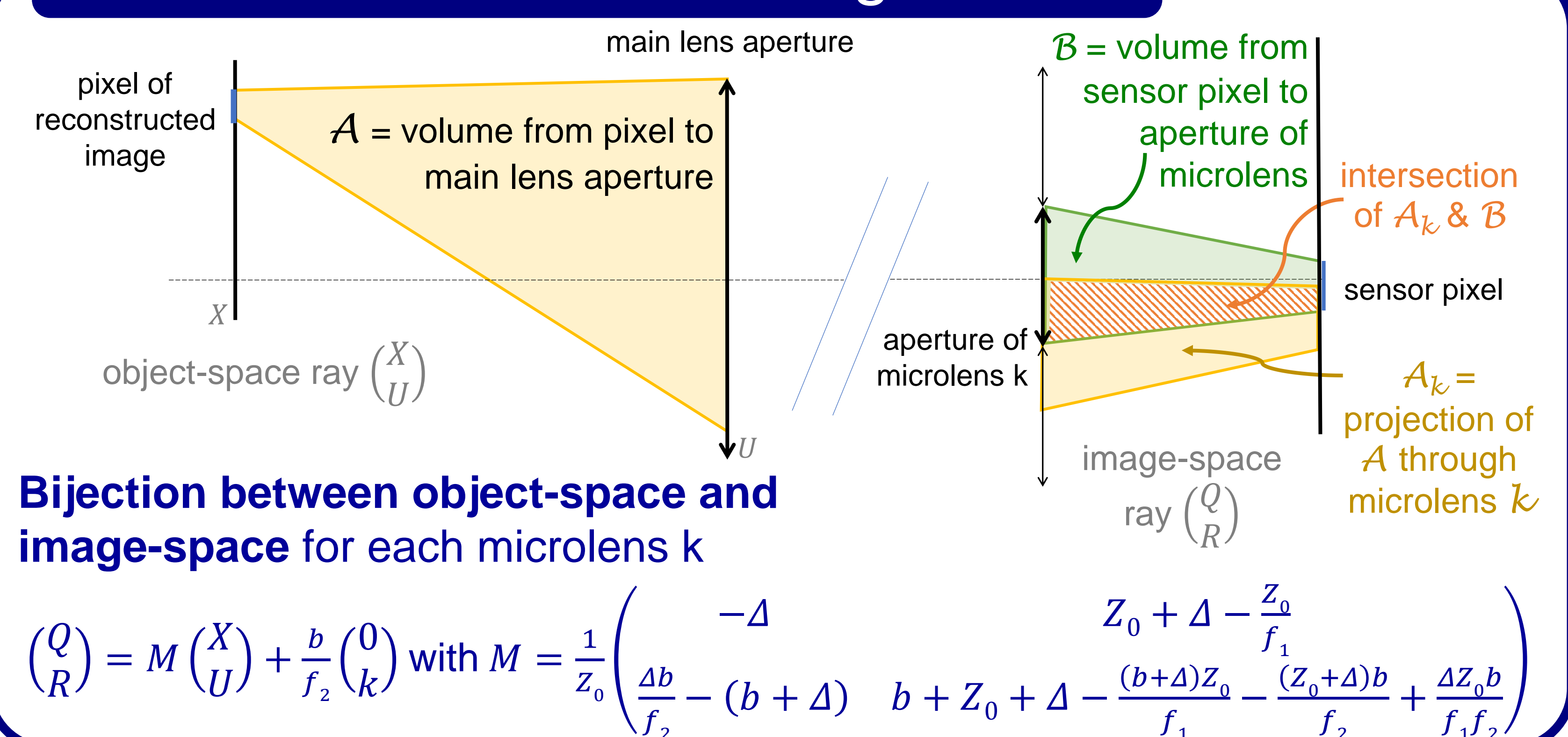
Introduction

A plenoptic camera allows to acquire and separate spatial and directional information of the light coming from a scene [1, 2]. It allows applications such as refocusing at different depths from the one where the image has been acquired. In the literature, different refocusing algorithms are presented for several optical plenoptic configurations [3 - 6]. We have previously shown the continuity between these optical designs, and the similarities and differences between the associated algorithms [7]. Here we propose a unique parameterization of the light rays in a plenoptic setup, allowing the development of a unique refocusing algorithm valid for any plenoptic configurations, based on the integration of étendues' intersections in the image-space. With this method, we aim at refocusing images at any distances from the camera, without the discontinuity due to the change of optical configurations.

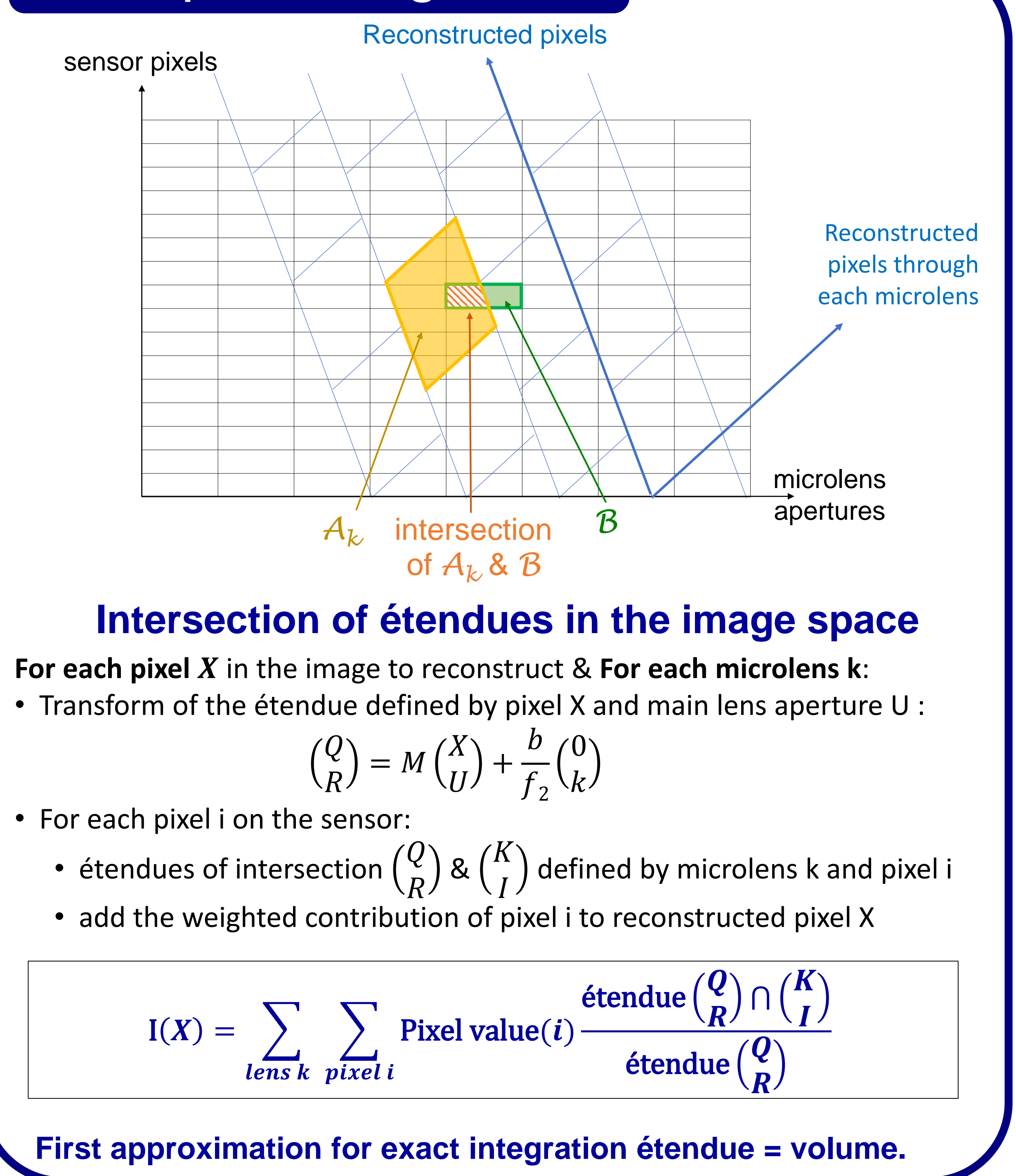
1. Validity domains of historical refocusing algorithms



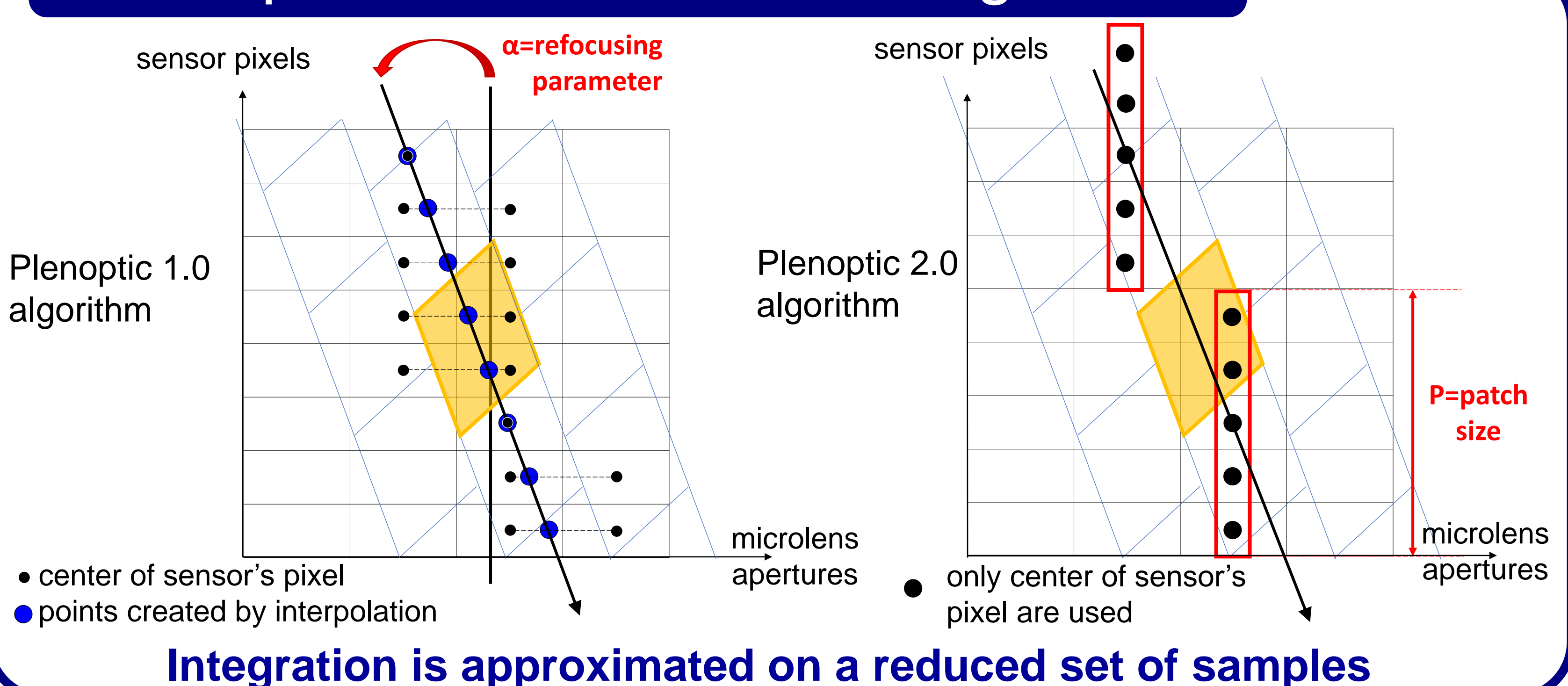
2. Parametrization of the Light-Field



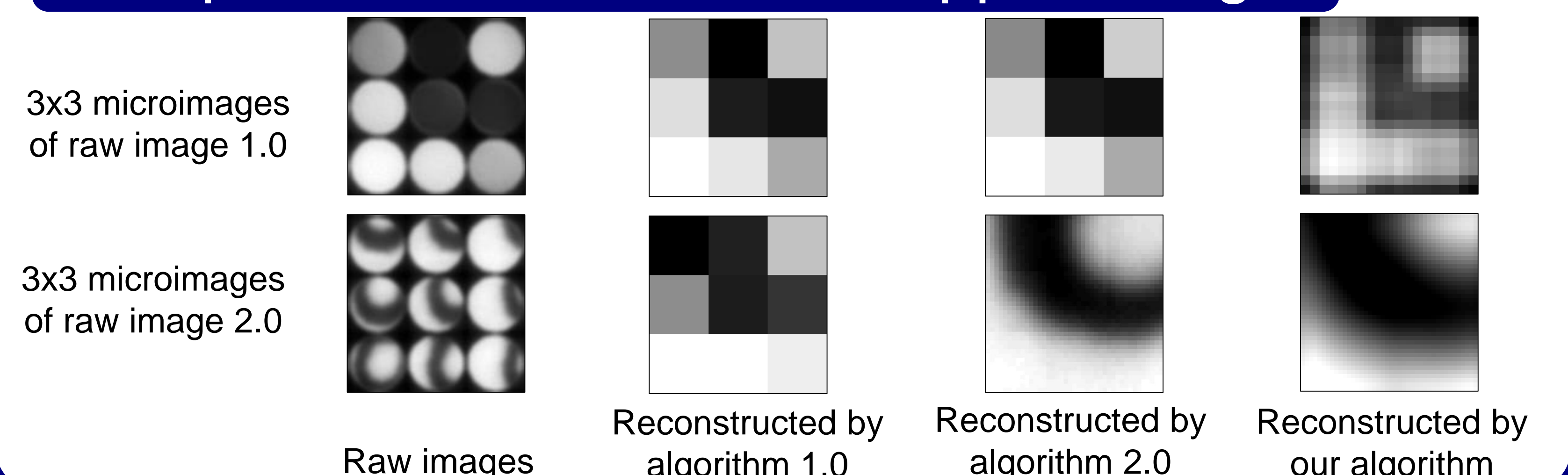
3. Proposed algorithm



4. Comparison with historical algorithms



5. Experimental results on cropped images



Conclusions

- Unification of the two historical algorithms.
- Algorithm based on the intersection of étendues instead of using pixels as points.
- First implementation of algorithm → validation of the idea.
- Future work: improving execution time.

References

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