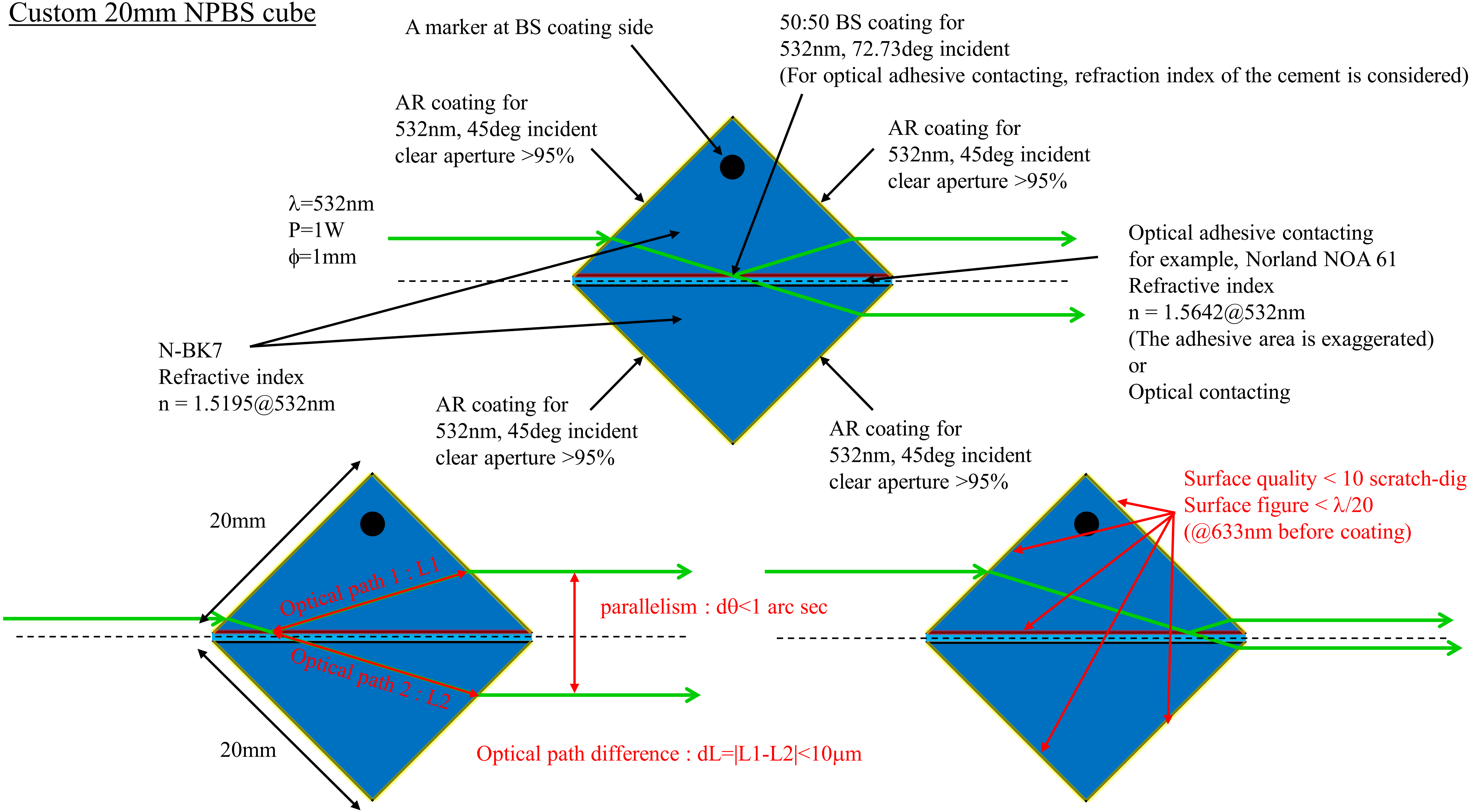
Custom 20mm NPBS cube



Reference 1

Vivienne Leidel. 2023. From Cooling Atoms Towards a Two Dimensional Fermi Gas. Master thesis, Heidelberg University Department of Physics and Astronomy.
http://ultracold.physi.uni-heidelberg.de/files/Masterarbeit_2023_Vivienne.pdf
page 44, 45, 59

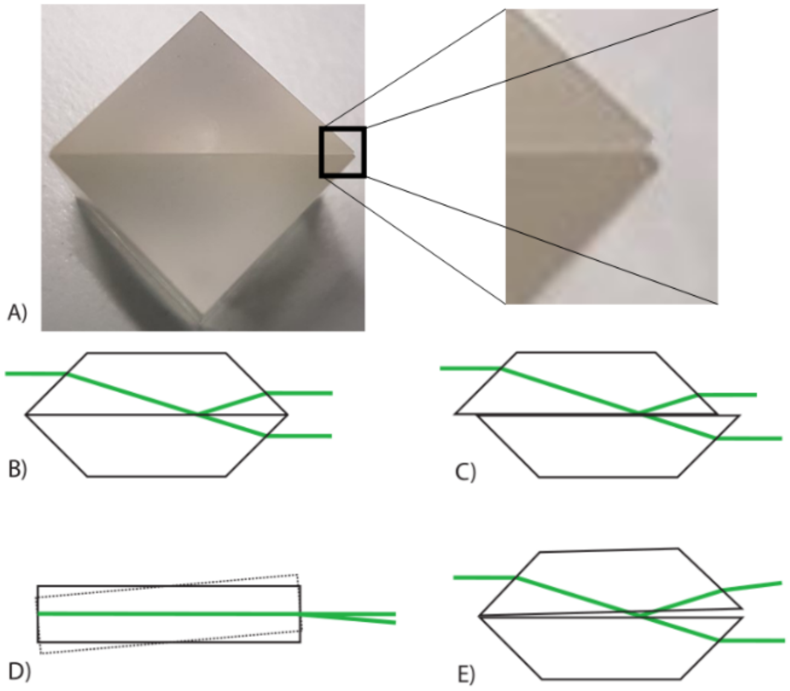


Figure 32: Possible misalignments NPBS. In A) a picture of a NPBS can be seen. The zoom of the edges shows the chamfer cut as well as a translation of the individual triangles to one another. B) shows the optimal setting. In C) a translation along the glued plane can be seen, leading to a phase difference between both beams. D) and E) show misalignments leading to the beams not being parallel. Taken in parts from [32].

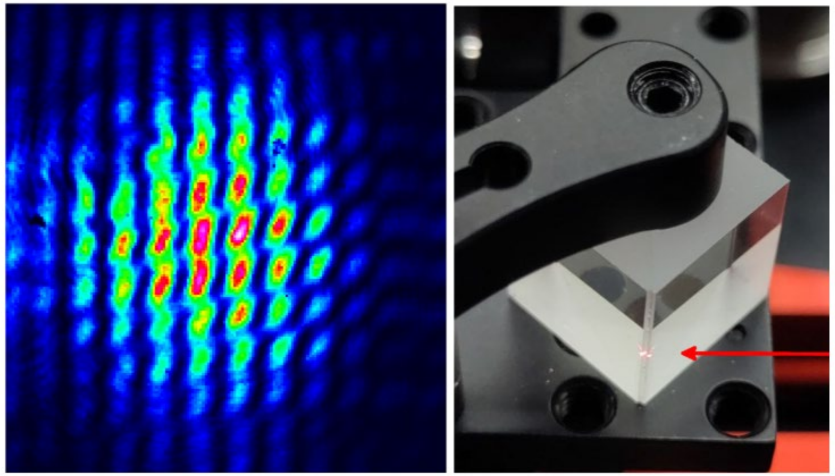


Figure 48: The left image shows the interference pattern for beams at the chamfercut. The right picture shows the beams at the chamfercut.

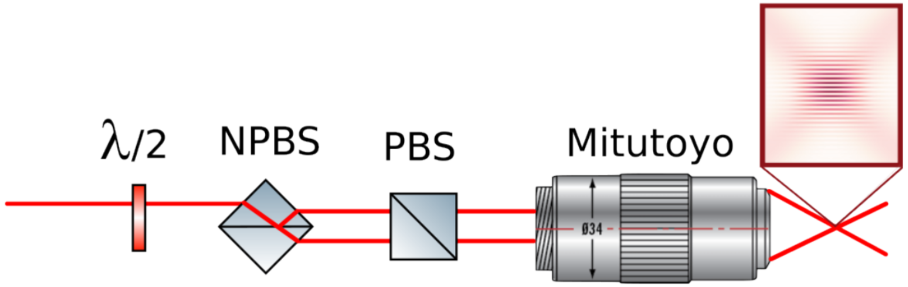


Figure 37: Schematic of the accordion setup. A λ/2 waveplate for the power splitting, a NPBS for the beam splitting, a PBS to clean the polarisation and finally the Mitutoyo objective to intersect the beams.

Reference 2

Hebert, Anne. 2021. A dipolar erbium quantum gas microscope. Doctoral dissertation, Harvard University Graduate School of Arts and Sciences.
https://dash.harvard.edu/bitstream/handle/1/37368261/PhD_Thesis_submitted.pdf?sequence=1&isAllowed=y
page 75-81

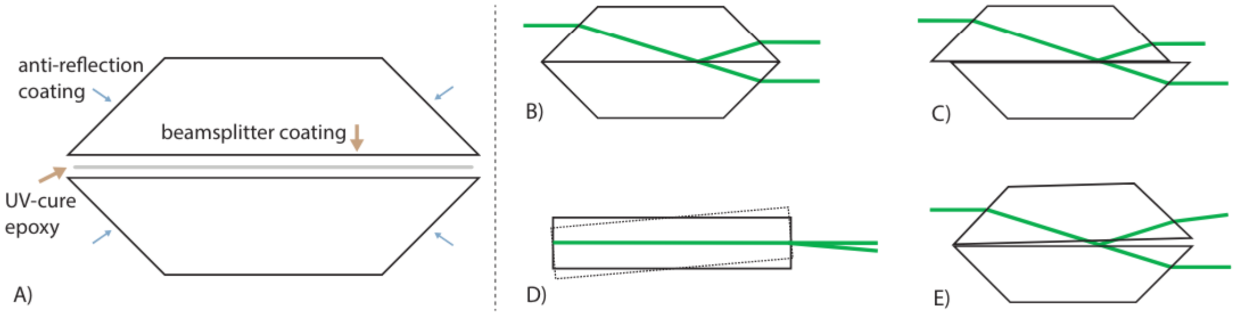


Figure 6.7: On the left, A) shows how the beamsplitters are assembled from two Thorlabs dove prisms. The anti-reflection coatings are labeled on the input and output faces of the dove prisms, and the beamsplitter coating is labeled on the face of one of each of the prism pairs. A thin layer of epoxy holds the assembly together. On the right, sketches of alignment of the two dove prisms forming the accordion lattice beamsplitter. B) shows the desired alignment, in which the two beam paths through the prism are equal and the two beams exit the beamsplitter with the same direction of propagation, they are simply offset from each other. C) shows a misalignment of the two prisms leading to unequal beam paths. D) and E) show two examples of misalignments of the two dove prisms leading to the beams exiting the beamsplitter not parallel relative to each other.

reflection and beamsplitter coating as shown in Figure 6.7. The anti-reflection coating on the entrance and exit faces of the prisms is a broadband coating giving a reflection of $< 2\%$ from 360nm - 700nm light. The coating is designed for *S*-polarization and for an incidence angle of 45°, as shown in Figure 6.7 B). The beamsplitter coating is also designed for *S*-polarization, and for 360 - 700 nm light, but with an incidence angle of 72.7°. It is designed for a NKB7 to NOA61 (the epoxy we're using) interface. Ideally the coating should provide a 50/50 splitting of the incoming beam into two beams of equal optical power so as to have maximal interference contrast in the lattice.

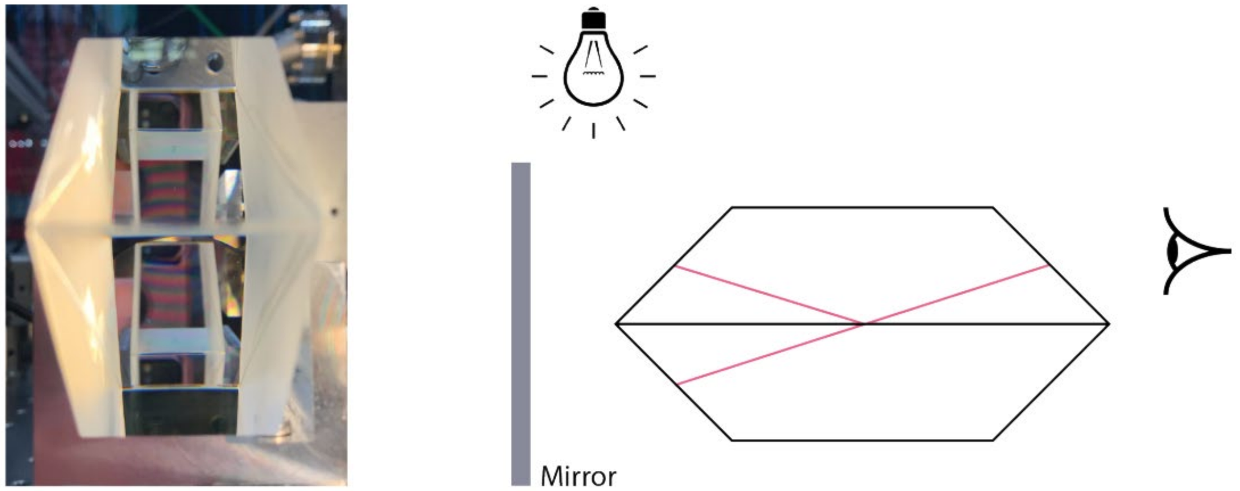


Figure 6.8: Picture (left) taken down the axis of the beamsplitter towards a mirror, as shown in the diagram (right). The interference fringes are visible in this picture, indicating that the two beam paths through the beamsplitter (as shown in diagram on the right) are equal.

so that they look well-aligned, then we adjust the alignment looking for these white light fringes. For first alignment, we use a mercury vapor lamp, with a coherence length on the order of 300 microns. Once we see fringes with this source, we then switch to our "white" room light, with a coherence length estimated to be on the order of a few microns, and tweak the alignment to reproduce the