M1	M2	M3	M4
Provides: Proof of physical principles with a moving beam system.			
Needs: Speed. Freedom from precision motorized stages.	Provides: Fixed beam geometry, divorcing the microscope from precision motorized stages. Many beam and many pixel parallelism concepts demonstrated.		
	Needs: Better light efficiency. More light-efficient method for generating many beams with easier alignment to an array of modulators.	Provides: Efficient beam splitting and alignment technology for an array of modulators. Array of beams generated with digital optics automatically aligned to a MEMS modulator array.	
		Needs: Better modulators with greater power-handling and surface quality than available MEMS.	Provides: Auto-aligned "modulators" of good quality and efficiency. Acousto-optic device used both as a highly-efficient beam-splitter and also as a modulator of each beam.

Table 3.1: The story of the four generations of apparatus.

	M1	M2	M3	M4
Number of beams	2	41	15	15
Beam-splitter	Beam-splitting cube	Hologram	Digital Optic	
Beam phase modulator	Translating wedge	Piezo-driven mirrors	Electrostatically driven MEMS mirror array	Acousto-optic modulator
Beam amplitude modulator	none	none	none	
Beam delivery to sample	Mirrors	Gratings, mirrors, and one spherical lens	Single-mode polarization-preserving fiber and spherical lenses	Mirrors and cylindrical lenses
Spatial filtering	Pinhole-type	Custom-etched copper slit array	Fiber optic as pinhole	none
Phase reference	Photodiode with slit in magnified path	0.5 NA microscope objective + CCD in magnified path	Far-field CCD	1.25 NA microscope objective + CCD in unmagnified path
Laser type	He-Ne	Argon ion	Argon ion	Diode
Wavelength Spectral purity	633 nm (red) multiple cavity modes	488 nm (blue) single-line and single-frequency	514 nm (green) single-line and single-frequency	685 nm (red) Single longitudinal mode

Table 3.2: Key specifications of the four prototypes.

	M4 SAM prototype (N.A. ≈ 0.92)	SAM in theory	Conventional 0.95 N.A. lens (63× Zeiss)	Lens technology
Working Distance	>30,000 μm	Set by low-N.A. lens	120 μm	Practical limit: decreases with N.A. according to a power law
Depth of field	>20λ	Set by low-N.A. lens	0.35λ	Theoretical limit: $\left[\frac{\lambda\sqrt{n_i^2-(N.A.)^2}}{(N.A.)^2}\right]$
Field of view	>5,000 μm available, 560 μm used	Set by low-N.A. lens or size of region of beam overlap	317 μm available	Practical limit: decreases with N.A. according to a power law
Resolution	>200 sub-pixels per pixel	Goes as the square of the number of beams	1 pixel per pixel	Always 1
Composition	No precision optics		Precision optics	

Table 4.1: A comparison of the final SAM prototype with state-of-the-art microscope lens performance and of SAM and lenses in general.