

Zeiss objectives (dry)

Objective	N.A.	Max. W.D. (mm)	Brightness (rel to 40x, 1.3 NA)	XY resolution (μm) ($\lambda_{\text{exc}} = 488 \text{ nm}$)	Z resolution (μm) ($\lambda_{\text{em}} = 515 \text{ nm}$ PH = 1 A.U.)	Optimal pixel size (μm) ($\lambda_{\text{exc}} = 488 \text{ nm}$)	Optimal slice spacing (μm) ($\lambda_{\text{em}} = 515 \text{ nm}$ PH = 1 A.U.)
2.5x air	0.075	9.3	0.3	3.969	164.8	1.985x1.985	82.40
5x air	0.16	12.2	1.5	1.861	36.21	0.930x0.930	18.11
10x air	0.30	5.6	4.5	0.992	10.30	0.496x0.496	5.150
	0.45	2.8	23	0.662	4.476	0.331x0.331	2.238
20x air	0.50	2.0	8.8	0.595	3.708	0.298x0.298	1.854
	0.75	0.61	44	0.397	1.648	0.198x0.198	0.824
40x air	0.60	3.3	5	0.496	2.575	0.248x0.248	1.288

Brightness $\propto \text{NA}^4/\text{M}^2$

Z res. $\approx 1.76 \cdot \lambda_{\text{em}} \cdot n \cdot \text{PH}/\text{NA}^2$

Pixel size = XY res./2 (Nyquist criterion)

XY res. $\approx 0.61 \cdot \lambda_{\text{exc}}/\text{NA}$

For widefield PH ≥ 5 A.U.

Slice spacing = Z res./2 (Nyquist criterion)

(Where M = magnification, PH = pinhole dia. [Airy Units], and n = ref. index = 1.000 [air], 1.337 [H₂O] and 1.518 [oil].)

Zeiss objectives (immersion)

Objective	N.A.	Max. W.D. (mm)	Brightness (rel to 40x, 1.3 NA)	XY resolution (μm) ($\lambda_{\text{exc}} = 488 \text{ nm}$)	Z resolution (μm) ($\lambda_{\text{em}} = 515 \text{ nm}$ PH = 1 A.U.)	Optimal pixel size (μm) ($\lambda_{\text{exc}} = 488 \text{ nm}$)	Optimal slice spacing (μm) ($\lambda_{\text{em}} = 515 \text{ nm}$ PH = 1 A.U.)
40x oil	1.30	0.20	100	0.229	0.833	0.114x0.114	0.416
63x H ₂ O	1.20	0.28	29	0.248	0.861	0.124x0.124	0.431
63x oil	1.40	0.19	54	0.213	0.718	0.106x0.106	0.359
100x oil	1.40	0.17	22	0.213	0.718	0.106x0.106	0.359

Brightness $\propto \text{NA}^4 / M^2$

Z res. $\approx 1.76 \cdot \lambda_{\text{em}} \cdot n \cdot \text{PH} / \text{NA}^2$

Pixel size = XY res./2 (Nyquist criterion)

XY res. $\approx 0.61 \cdot \lambda_{\text{exc}} / \text{NA}$

For widefield PH ≥ 5 A.U.

Slice spacing = Z res./2 (Nyquist criterion)

(Where M = magnification, PH = pinhole dia. [Airy Units], and n = ref. index = 1.000 [air], 1.337 [H₂O] and 1.518 [oil].)