Table 1: SISO-FSO work survey.

Ref.	Detection	Turbulence model
[33]	Direct	LN and GG (Numerical)
[49]	Coherent	EW
[50, 51]	Direct	LN and GG
[52]	Direct and Coherent	GG
[47, 53]	Direct and Coherent	MG
[48]	Direct and Coherent	GG
[54]	Direct	the exponentiated Weibull

Table 2: $\mathcal{C}_{mod}$ and $\mathcal{D}_{mod}$ parameters. The first three rows use $P_e = \mathcal{C}_{mod}\,\mathrm{erfc}\,\sqrt{\mathcal{D}_{mod}\gamma}$ (BPSK: $\frac{1}{2}\,\mathrm{erfc}\,\sqrt{\gamma}$); DBPSK uses $P_e = \mathcal{C}_{mod}e^{-\mathcal{D}_{mod}\gamma} = \frac{1}{2}e^{-\gamma}$, so equal numerical values refer to different functional forms.

Modulation Scheme	$\mathcal{C}_{mod}$	$\mathcal{D}_{mod}$	M
BPSK (erfc form)	1 / 2	1	-
M -PSK	1	$\sin^2(\pi/M)$	> 4
square M -QAM	2-2 / $\sqrt{M}$	3/(2(M-1))	≥ 4
DBPSK (exponential form)	1 / 2	1	-

Table 3: FSO link parameters.

Parameter	**Symbol**	**Value**
Transceiver at high altitude settings	Z_{u1}	600 m
Transceiver at low altitude settings	Z_{u2}	200 m
Angle between the link and the vertical	ψ	70^o
Rytov variance (plane wave)	σ_R^2	0.13, 0.53, 2.65
Threshold SNR	γ_T	3 dB
Diameter of receiving aperture	$2a$	10 cm
Diameter of transmitting aperture	D_T	10 cm
Transceiver position standard deviation	σ_p	10 cm
Transceiver orientation standard deviation	σ_ψ	1×10^{-6}
Index of refraction structure parameter	C_n^2	$[5 \times 10^{-15} - 1 \times 10^{-13}]$
Optical wavelength	λ	1550×10^{-9} m
Beam divergence angle	θ_{div}	2 $mrad$
Ring radius of the receivers	$\mathbb{R}_{crl}$	$3a = 15$ cm
Gauss-Laguerre nodes	c	100

Table 4: MIMO-FSO work survey.

Ref.	Combining methods	Turbulence model	Pointing errors
[58]	OC-EGC	LN	-
[59]	SC	LN	-
[24]	OC-EGC	LN and Rayleigh,	-
[60]	MLC-SOC	LN and Neg. Exp	-
[20]	Alamouti	GG	
[61]	EGC-MRC	GG	Considered
[62]	EGC	LN	Considered
[63]	OSM/MLD	LN, GG, and Neg. Exp	Considered

Table 5: MSE accuracy of CDF Derived Model.

C_n^2	AT	SIMO(1,5)	MIMO(3,5)	MIMO(5,5)
5×10^{-15}	LN	2.18×10^{-6}	3.03×10^{-6}	2.85×10^{-6}
	GG	4.64×10^{-8}	1.62×10^{-7}	5.00×10^{-7}
2×10^{-14}	LN	6.71×10^{-6}	5.76×10^{-6}	4.64×10^{-6}
	GG	1.26×10^{-7}	1.84×10^{-8}	1.63×10^{-8}
1×10^{-13}	LN	1.04×10^{-5}	8.11×10^{-5}	7.03×10^{-5}
	GG	1.87×10^{-7}	9.81×10^{-8}	1.08×10^{-7}

Table 6: Relative error $(\mathrm{P}_{\mathrm{MC}} - p)/p$ of the fitted α-μ lower tail, 10^8 Monte Carlo samples. †fewer than 30 events.

	GG		LN	
p	MIMO(3,5)	SIMO(1,5)	MIMO(3,5)	SIMO(1,5)
10^{-3}	+2%	+5%	−49%	−51%
10^{-4}	+5%	+11%	−65%	−68%
10^{-5}	+7%	+16%	−80%	−78%
10^{-6}	+10%	+16%	−91%†	−83%

Table 7: Ergodic capacity and capacity with outage $C_{\text{out}}(10^{-3})$ [bit/s/Hz], coherent detection, moderate turbulence ($C_n^2 = 2 \times 10^{-14}$), 4×10^6 Monte Carlo samples.

SNR	SISO		MIMO(3,5)		AWGN
[dB]	ergodic	C_{out}	ergodic	C_{out}	$\log_2(1+\bar{\gamma})$
10	3.22	0.75	3.44	2.73	3.46
20	6.36	2.96	6.64	5.84	6.66
30	9.66	6.11	9.95	9.13	9.97