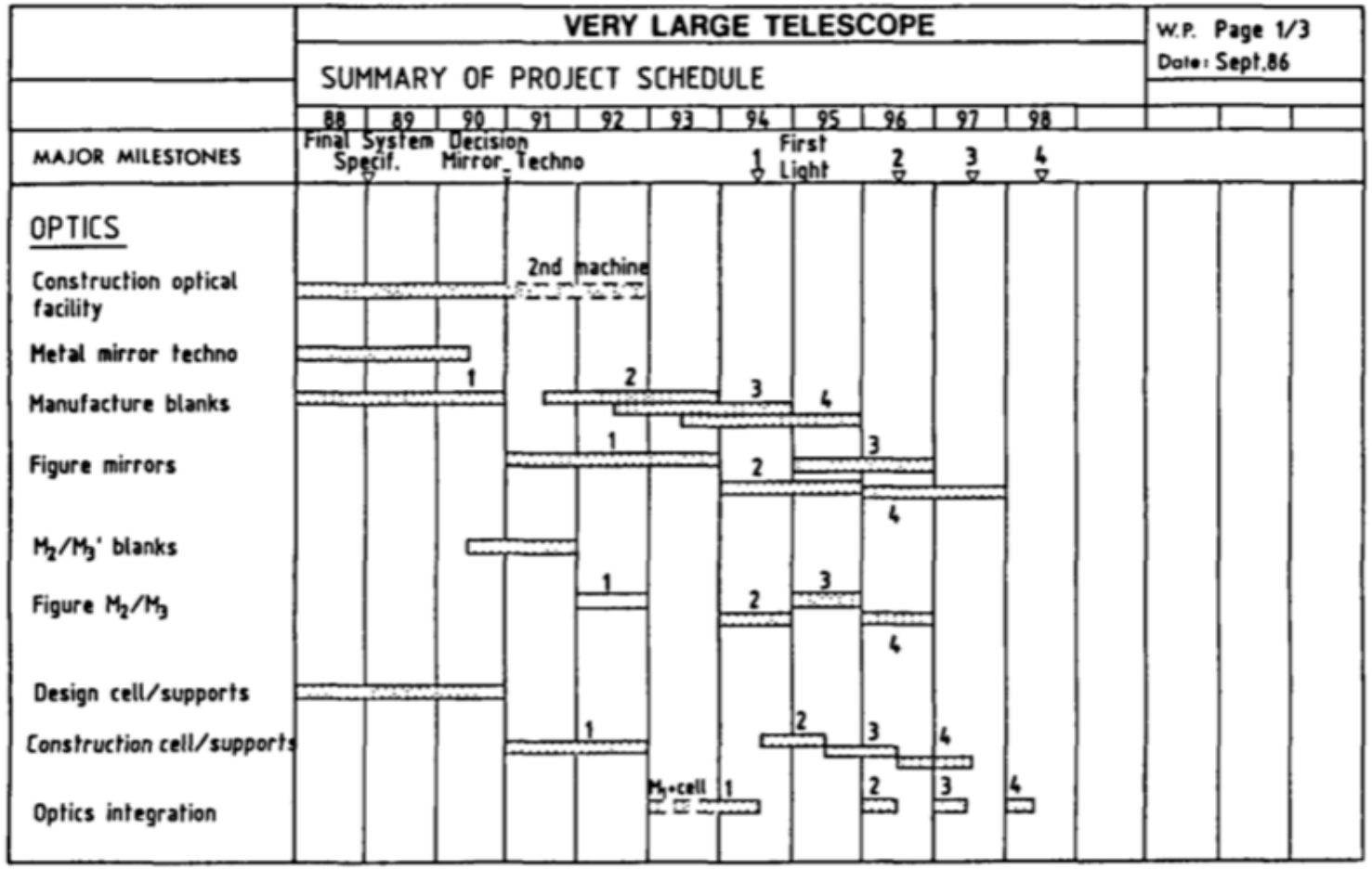
Jason Spyromilio

"The VLT: Riccardo Revolutionising Ground Based Astronomy”

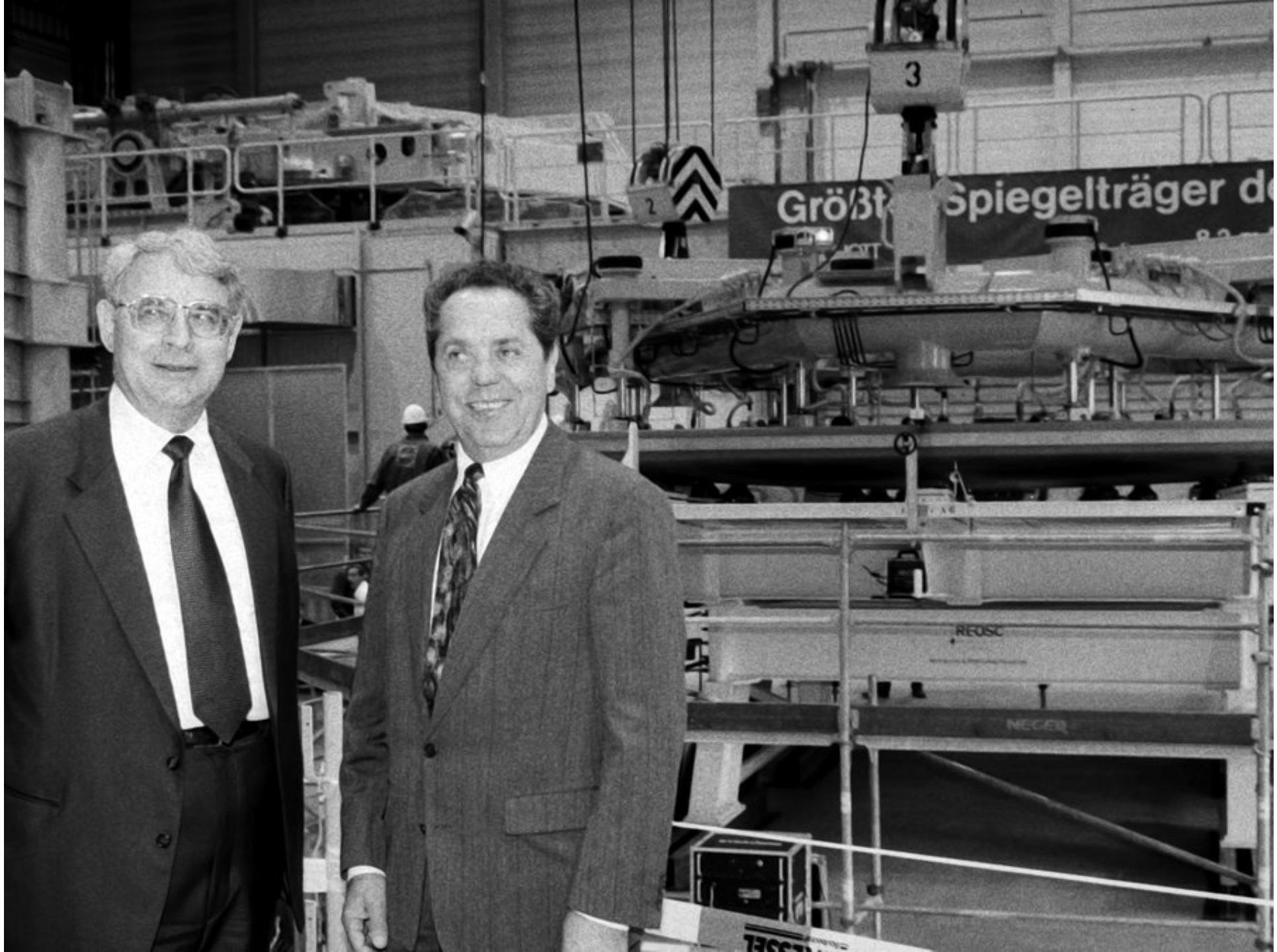
Giacconi Memorial Symposium

The project would be completed in 1998, if a decision is taken in 1987.



REQUIRED CASH FLOW IN MDM (1986) DURING THE EXECUTION OF THE PROJECT

YEAR	VLT	INSTRUMENT. DEVELOPMENT	PARANAL DEVELOPMENT	TOTAL
1989	18			18
1990	21			21
1991	32	6	10	48
1992	37	6	6	49
1993	40	4	5	49
1994	40	5	4	49
1995	33	7		40
1996	33	7		40
1997	33	7		40
1998	22.2	6		28.2
	309.2	48	25	382.2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Current status of optical grade sputtered, bare beryllium, and nickel-plated beryllium

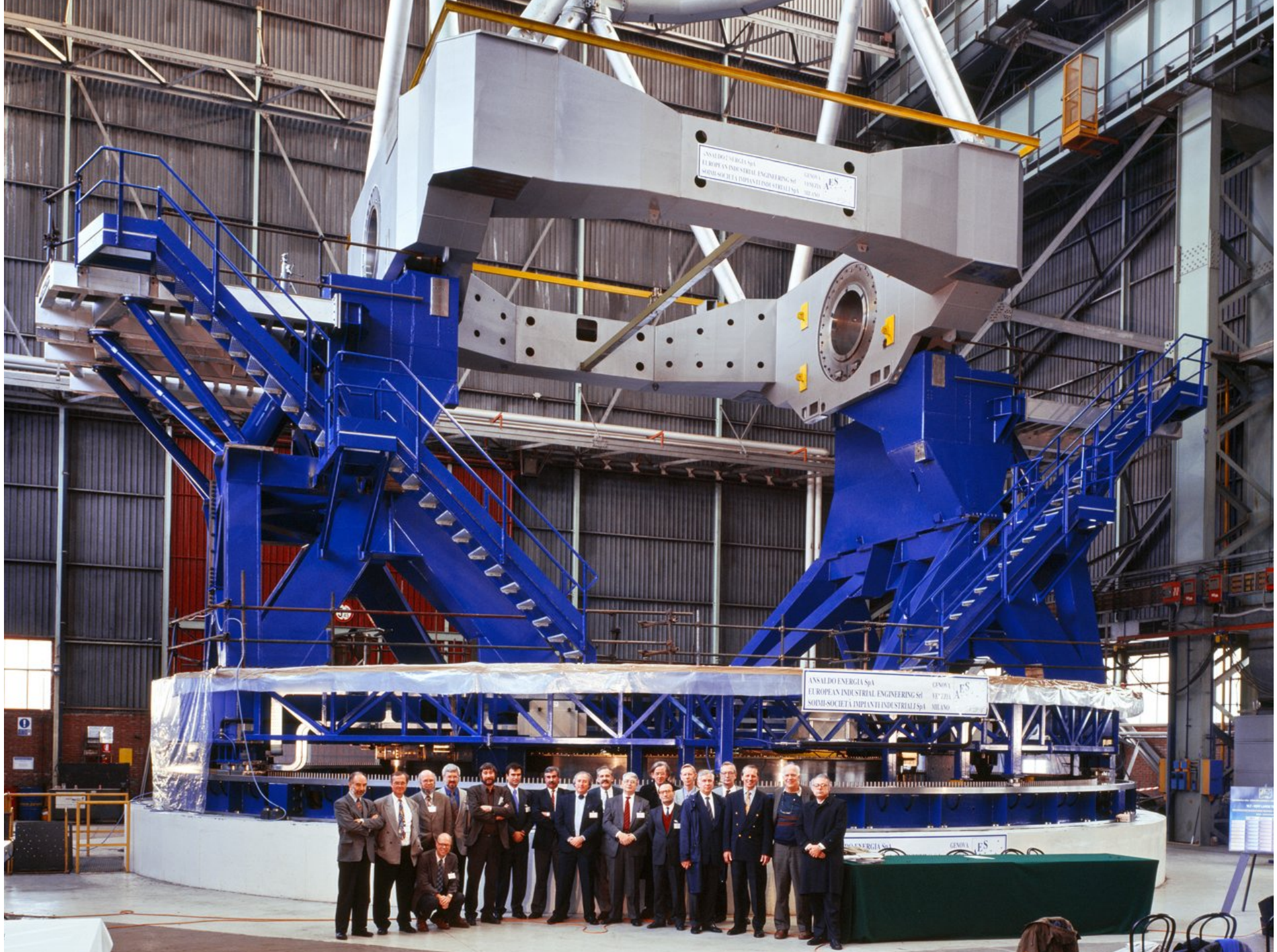
E. A. (Bill) Roybal, Malcolm B. McIntosh, and Howard K. Hull

Ball Aerospace & Technologies Corp.
Aerospace Systems Division
1600 Commerce Street
Boulder, CO 80302

or the substrate is not properly prepared, the electroless nickel will not be stable and can peel from the beryllium substrate. The largest precision optical component manufactured from beryllium to date is the 1.1-m Very Large Telescope (VLT) secondary mirror. This nickel-plated mirror is made from Hot Isostatic Pressed (HIP) I-220 beryllium and has a λ/30 rms surface figure. Table 1 lists exemplary mirror types and projects with which Ball has working experience, and Section 2, Figures 1 through 6, show selected components and instruments.

Table 1: Optical instruments utilizing beryllium in high-performance structures and mirrors

Project	Description	Shape	Size (mm)	Weight (Approx.)	Figure @ 633 nm	Roughness
EarthWatch 1996	Ni-plated Be mirror for a gimbaled mirror assembly	Elliptical Flat	280x432	2.00 kg	λ/6 PV	< 20 Å
Beam Walk	Ni-plated Be mirror used in a FSM assembly	Circular Flat	180	435 g	λ/6 PV	< 15 Å
ITEK	Bare Be mirror used in a FSM assembly	Square Flat	152x152	150 g	λ/5 PV	< 30 Å
ITEK 1997	Spare sputtered Be mirror used in a FSM assembly	Square Flat	152x152	150 g	NA	< 15 Å
RME	Bare Be mirror used in a relay assembly	Circular Flat	610	9.5 kg	λ/3 PV	< 50 Å
SILEX 1996	Ni-plated Be mirror used in a FSM assembly	Square Flat	32x32	3.5 g	λ/8 PV	< 15 Å
SIRTF 1996	Bare Be primary mirror for IR space telescope	Circular Hyperboloid	850	15.1 kg	2λ PV	< 30 Å
TIR 1996	Bare Be mirror for a scanning mirror assembly	Elliptical Flat	280x432	1.21 kg	λ/6 PV	< 30 Å
THEL 1997	Bare Be mirror used in a FSM assembly	Square Flat	152x152	290 g	λ/4 PV	< 40 Å
YSB 1956 & 1996	Ni-plated Be mirrors used in an all Be telescope	Folded Gregorian	CA 305	10 kg	System λ/4 PV	< 20 Å
VLT	Ni-plated Be chopping secondary mirror	Circular	1200	45.0 kg	λ/30 rms	<30Å
HDOS	Bare IP-70 Be IRAD mirror	Circular Ellipsoidal	1000	18.0 kg	1λ	NA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GENOVA
MILANO


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Very Large Telescope
GONDRAND
VERY
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