

Comparison tables: BBOB 2009 noisy testbed in 40-D

The BBOBies

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Abstract

This document provides tabular results of the workshop for Black-Box Optimization Benchmarking at GECCO 2009, see <http://coco.gforge.inria.fr/doku.php?id=bbob-2009>. More than 30 algorithms have been tested on 24 benchmark functions in dimensions between 2 and 40. A description of the used objective functions can be found in [9, 5]. The experimental set-up is described in [8].

The performance measure provided in the following tables is the expected number of objective function evaluations to reach a given target function value (ERT, expected running time), divided by the respective value for the best algorithm. Consequently, the best (smallest) value is 1 and the value 1 appears in each column at least once. See [8] for details on how ERT is obtained. All numbers are computed with no more than two digits of precision.

Table 1: 40-D, running time excess ERT/ERT_{best} on f_{101} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

101 Sphere moderate Gauss											
Δf_{target} ERT_{best}/D	1e+03 0.025	1e+02 6.48	1e+01 14.6	1e+00 22.6	1e-01 31.4	1e-02 39.4	1e-03 47.8	1e-04 55.7	1e-05 63.9	1e-07 80.9	Δf_{target} ERT_{best}/D
ALPS	1	13	29	37	41	45	48	52	55	68	ALPS [11]
AMaLGaM IDEA	1	25	37	40	39	38	36	37	37	35	AMaLGaM IDEA [4]
BayEDAeG	1	37	40	39	38	38	41	<i>25e-5/2e3</i>	.	.	BayEDAeG [6]
BFGS	1	<i>30e+1/2e3</i>	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	1	1	1	1	1	1	1	1	(1+1)-CMA-ES [2]
DASA	1	4.4	5	5.7	6.4	7.2	7.7	7.9	8.2	8.5	DASA [12]
DEPSO	1	4.7	9.8	31	<i>17e-2/2e3</i>	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	8.9	11	12	13	13	13	13	13	13	iAMaLGaM IDEA [4]
(1+1)-ES	1	2	2.6	2.3	2.3	2.8	3.4	4.4	4.7	13	(1+1)-ES [1]
Monte Carlo	1	<i>14e+1/1e6</i>	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEPP-CMA-ES	1	1.2	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	IPOP-SEPP-CMA-ES [13]

Table 2: 40-D, running time excess ERT/ERT_{best} on f_{102} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

102 Sphere moderate unif												
Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}	
ERT_{best}/D	0.025	8.36	20.5	32.1	43.6	55.3	65.7	77.5	88.9	113	ERT_{best}/D	
ALPS	1	11	23	28	32	35	38	40	43	59	ALPS [11]	
iAMaLGaM IDEA	1	22	30	27	27	26	27	26	26	26	iAMaLGaM IDEA [4]	
BayEDAcG	1	30	29	28	28	28	28	<i>29e-5/2e3</i>	.	.	BayEDAcG [6]	
BFGS	1	<i>29e+1/2e3</i>	.	.	.	.	.	.	.	.	BFGS [14]	
BIPOP-CMA-ES	1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	1	1.5	1.3	1.1	1	1.5	3.7	11	31	<i>19e-7/1e4</i>	(1+1)-CMA-ES [2]	
DASA	1	5.3	14	16	100	1200	6.6e4	<i>42e-4/3e5</i>	.	.	DASA [12]	
DEPSO	1	4	7.1	23	230	<i>16e-2/2e3</i>	.	.	.	.	DEPSO [7]	
iAMaLGaM IDEA	1	6.4	8	8.7	9.1	9.2	9.6	9.6	9.7	9.7	iAMaLGaM IDEA [4]	
(1+1)-ES	1	57	3900	4.4e5	<i>27e-1/1e6</i>	.	.	.	.	.	(1+1)-ES [1]	
Monte Carlo	1	<i>13e+1/1e6</i>	.	.	.	.	.	.	.	.	Monte Carlo [3]	
IPOP-SEP-CMA-ES	1	1	1	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]	

Table 3: 40-D, running time excess ERT/ERT_{best} on f_{103} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

103 Sphere moderate Cauchy												
Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}	
ERT_{best}/D	0.025	5.92	13.2	30.6	42.3	54	68	81.6	95.4	124	ERT_{best}/D	
ALPS	1	15	34	28	120	<i>41e-3/1e5</i>	.	.	.	.	ALPS [11]	
AMaLGaM IDEa	1	24	47	30	26	24	22	36	68	130	AMaLGaM IDEa [4]	
BayEDAcG	1	41	44	29	28	31	29	<i>33e-5/2e3</i>	.	.	BayEDAcG [6]	
BFGS	1	73	48	29	21	17	13	12	10	8	BFGS [14]	
BIPOP-CMA-ES	1	1.5	1.7	1.1	1.1	1.1	1.1	1.1	1.1	1.1	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	1	1.3	1.1	1.1	5.3	1300	<i>13e-3/1e4</i>	.	.	.	(1+1)-CMA-ES [2]	
DASA	1	4.2	6.1	5.1	260	<i>36e-3/3e5</i>	.	.	.	.	DASA [12]	
DEPSO	1	5.2	12	62	<i>79e-2/2e3</i>	.	.	.	.	.	DEPSO [7]	
iAMaLGaM IDEa	1	9.8	13	9.1	12	21	49	85	350	560	iAMaLGaM IDEa [4]	
(1+1)-ES	1	1	1	1	6.5	2.3e4	<i>84e-4/1e6</i>	.	.	.	(1+1)-ES [1]	
Monte Carlo	1	<i>14e+1/1e6</i>	.	.	.	.	.	.	.	.	Monte Carlo [3]	
IPOP-SEP-CMA-ES	1	1.3	1.5	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]	

Table 4: 40-D, running time excess ERT/ERT_{best} on f_{104} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

104 Rosenbrock moderate Gauss												
Δf_{target} ERT _{best} /D	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target} ERT _{best} /D	
ALPS	34	21	1	3.4	9.5	20	<i>14e-1/1e5</i>	3.7	3.7	3.7	ALPS [11]	
AMaLGaM IDEA	23	3.3	4.1	3.7	3.7	3.7	3.7	3.7	3.7	3.7	AMaLGaM IDEA [4]	
BayEDAcG	31	7.9	<i>63e+0/2e3</i>								BayEDAcG [6]	
BFGS	<i>50e+4/1e3</i>										BFGS [14]	
BIPOP-CMA-ES	1.4	1	1.1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	1	1	<i>39e+0/1e4</i>								(1+1)-CMA-ES [2]	
DASA	5.5	45	4.9	31	<i>74e-1/4e5</i>						DASA [12]	
DEPSO	13	13	<i>96e+0/2e3</i>								DEPSO [7]	
iAMaLGaM IDEA	9.4	1.3	18	20	23	28	28	27	27	27	iAMaLGaM IDEA [4]	
(1+1)-ES	1.5	24	<i>45e+0/1e6</i>								(1+1)-ES [1]	
Monte Carlo	<i>93e+3/1e6</i>										Monte Carlo [3]	
IPOP-SEP-CMA-ES	1.3	5.3	<i>37e+0/1e4</i>								IPOP-SEP-CMA-ES [13]	

Table 5: 40-D, running time excess ERT/ERT_{best} on f_{105} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT _{best} /D	23.9	166	1.4e5	1.48e5	1.51e5	1.52e5	1.53e5	1.54e5	1.55e5	1.57e5	ERT_{best}/D
ALPS [11]	25	36	1.4	3.6	<i>10e+0/1e5</i>	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	21	5.3	<i>35e+0/1e6</i>	.	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDA cG	25	14	<i>81e+0/2e3</i>	.	.	.	.	.	.	.	BayEDA cG [6]
BFGS	<i>46e+4/900</i>	.	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1.1	1	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1.4	23	<i>72e+0/1e4</i>	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	6.9	2100	<i>96e+0/3e5</i>	.	.	.	.	.	.	.	DASA [12]
DEPSO	10	32	<i>10e+1/2e3</i>	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	7.5	1.9	<i>35e+0/1e6</i>	.	.	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	20	4.4e4	<i>15e+1/1e6</i>	.	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	<i>99e+3/1e6</i>	.	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	9.2	<i>38e+0/1e4</i>	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 6: 40-D, running time excess ERT/ERT_{best} on f_{106} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

106 Rosenbrock moderate Cauchy											
Δ ftarget	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δ ftarget
ERT _{best} /D	16.9	47.9	1730	2270	2390	2450	2490	2520	2540	2600	ERT _{best} /D
ALPS	36	60	38	160	<i>39e-1/1e5</i>	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	26	18	<i>27e+0/1e6</i>	.	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDA cG	34	71	<i>10e+1/2e3</i>	.	.	.	.	.	.	.	BayEDA cG [6]
BFGS	<i>12e+3/4e3</i>	.	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1.6	1.6	1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1.1	1	<i>28e+0/1e4</i>	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	5.8	22	14	200	<i>73e-2/7e5</i>	.	.	.	.	.	DASA [12]
DEPSO	15	95	<i>11e+1/2e3</i>	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	10	6.5	<i>29e+0/1e6</i>	.	.	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1	2.2	8300	<i>13e+0/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	<i>92e+3/1e6</i>	.	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1.3	1.3	1	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 7: 40-D, running time excess ERT/ERT_{best} on f_{107} , in italics is given the median number of function evaluations to reach this value divided by dimension

107 Sphere Gauss												
	Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}
ERT _{best} /D	ERT _{best} /D	0.025	225	960	1440	1870	2170	2440	2720	3010	3620	ERT _{best} /D
ALPS	ALPS [11]	1	10	<i>35e+0/1e5</i>	48	50	45	41	39	36	32	ALPS [11]
AMaLGaM IDEA	AMaLGaM IDEA [4]	1	1.5	15	15	15	15	15	15	15	15	AMaLGaM IDEA [4]
BayEDA-cG	BayEDA-cG [6]	1	2.7	<i>22e+0/2e3</i>	48	50	45	41	39	36	32	BayEDA-cG [6]
BFGS	BFGS [14]	1	<i>22e+1/1e3</i>	1	1	1	1	1	1	1	1	BFGS [14]
BIPOP-CMA-ES	BIPOP-CMA-ES [10]	1	1.7	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	(1+1)-CMA-ES [2]	1	<i>22e+1/1e4</i>	1	1	1	1	1	1	1	1	(1+1)-CMA-ES [2]
DASA	DASA [12]	1	<i>20e+1/2e5</i>	1	1	1	1	1	1	1	1	DASA [12]
DEPSO	DEPSO [7]	1	<i>19e+1/2e3</i>	1	1	1	1	1	1	1	1	DEPSO [7]
iAMaLGaM IDEA	iAMaLGaM IDEA [4]	1	1	130	110	140	170	150	140	130	110	iAMaLGaM IDEA [4]
(1+1)-ES	(1+1)-ES [1]	1	<i>17e+1/1e6</i>	1	1	1	1	1	1	1	1	(1+1)-ES [1]
Monte Carlo	Monte Carlo [3]	1	<i>13e+1/1e6</i>	1	1	1	1	1	1	1	1	Monte Carlo [3]
IPOP-SEP-CMA-ES	IPOP-SEP-CMA-ES [13]	1	660	<i>17e+1/1e4</i>	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 8: 40-D, running time excess ERT/ERT_{best} on f_{108} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT_{best}/D	0.025	2340	5370	14000	23400	37400	45900	52500	70400	$1.06e5$	ERT_{best}/D
ALPS	1	120	<i>11e+1/1e5</i>								ALPS [11]
AMaLGaM IDEA	1	4.1	130	520	630	<i>46e-1/1e6</i>					AMaLGaM IDEA [4]
BayEDA cG	1	<i>22e+1/2e3</i>									BayEDA cG [6]
BFGS	1	<i>32e+1/800</i>									BFGS [14]
BIPOP-CMA-ES	1	1	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	<i>22e+1/1e4</i>									(1+1)-CMA-ES [2]
DASA	1	<i>23e+1/2e5</i>									DASA [12]
DEPSO	1	<i>31e+1/2e3</i>									DEPSO [7]
iAMaLGaM IDEA	1	20	270	520	<i>82e-1/1e6</i>						iAMaLGaM IDEA [4]
(1+1)-ES	1	<i>18e+1/1e6</i>									(1+1)-ES [1]
Monte Carlo	1	<i>14e+1/1e6</i>									Monte Carlo [3]
IPOP-SEP-CMA-ES	1	<i>29e+1/1e4</i>									IPOP-SEP-CMA-ES [13]

Table 9: 40-D, running time excess ERT/ERT_{best} on f_{109} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

109 Sphere Cauchy												
	Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT_{best}/D	0.025	7.73	12	21	36.4	62.6	91.8	124	156	188	251	ERT_{best}/D
ALPS [11]	1	<i>12</i>	<i>1.4e4</i>	<i>11e+0/1e5</i>	<i>15</i>	<i>46</i>	<i>130</i>	<i>140</i>	<i>150</i>	<i>150</i>	<i>150</i>	ALPS [11]
AMaLGaM IDEA [4]	1	16	16	16	16	23	46	<i>10e-3/2e3</i>				AMaLGaM IDEA [4]
BayEDA cG [6]	1	31	28	26	26	23	46					BayEDA cG [6]
BFGS [14]	1	<i>33e+1/2e3</i>										BFGS [14]
BIPOP-CMA-ES [10]	1	1	1	1.1	1.1	1.1	1.1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES [2]	1	5.6	390	<i>87e-1/1e4</i>								(1+1)-CMA-ES [2]
DASA [12]	1	240	60	<i>37e+0/2e5</i>								DASA [12]
DEPSO [7]	1	4.8	60	<i>62e-1/2e3</i>								DEPSO [7]
iAMaLGaM IDEA [4]	1	7.4	9.7	1600	27	87	230	490	430	410	350	iAMaLGaM IDEA [4]
(1+1)-ES [1]	1	1.9										(1+1)-ES [1]
Monte Carlo [3]	1	<i>13e+1/1e6</i>										Monte Carlo [3]
IPOP-SEP-CMA-ES [13]	1	1	1	1	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 10: 40-D, running time excess ERT/ERT_{best} on f_{110} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

110 Rosenbrock Gauss											
Δf_{target} ERT _{best} /D	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target} ERT _{best} /D
ALPS	160	<i>73e+1/1e5</i>	.	.	.	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	4.6	3.7	<i>38e+0/1e6</i>	.	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDAeG	4.5	<i>72e+1/2e3</i>	.	.	.	.	.	.	.	.	BayEDAeG [6]
BFGS	<i>52e+4/500</i>	.	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1	<i>37e+0/1e6</i>	.	.	.	.	.	.	.	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	<i>24e+4/1e4</i>	.	.	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	<i>23e+4/2e5</i>	.	.	.	.	.	.	.	.	.	DASA [12]
DEPSO	<i>35e+4/2e3</i>	.	.	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	6	33	<i>39e+0/1e6</i>	.	.	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	<i>14e+4/1e6</i>	.	.	.	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	<i>92e+3/1e6</i>	.	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	<i>40e+3/1e4</i>	.	.	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 11: 40-D, running time excess ERT/ERT_{best} on f_{111} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

111 Rosenbrock unif												
Δf_{target} ERT _{best} /D	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target} ERT _{best} /D	
ALPS	<i>30e+3/1e5</i>	.	.	.	.	.	.	.	.	.	ALPS [11]	
AMaLGaM IDEA	6.2	18	<i>71e+0/1e6</i>	.	.	.	.	.	.	.	AMaLGaM IDEA [4]	
BayEDA _{cG}	<i>21e+3/2e3</i>	.	.	.	.	.	.	.	.	.	BayEDA _{cG} [6]	
BFGS	<i>46e+4/400</i>	.	.	.	.	.	.	.	.	.	BFGS [14]	
BIPOP-CMA-ES	1	1	<i>38e+0/1e6</i>	.	.	.	.	.	.	.	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	<i>27e+4/1e4</i>	.	.	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]	
DASA	<i>24e+4/2e5</i>	.	.	.	.	.	.	.	.	.	DASA [12]	
DEPSO	<i>44e+4/2e3</i>	.	.	.	.	.	.	.	.	.	DEPSO [7]	
iAMaLGaM IDEA	44	37	<i>59e+0/1e6</i>	.	.	.	.	.	.	.	iAMaLGaM IDEA [4]	
(1+1)-ES	<i>16e+4/1e6</i>	.	.	.	.	.	.	.	.	.	(1+1)-ES [1]	
Monte Carlo	<i>94e+3/1e6</i>	.	.	.	.	.	.	.	.	.	Monte Carlo [3]	
IPOP-SEP-CMA-ES	<i>49e+4/1e4</i>	.	.	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]	

Table 12: 40-D, running time excess ERT_{best} on f_{112} , in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

112 Rosenbrock Cauchy											
Δf_{target} ERT_{best}/D	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target} ERT_{best}/D
ALPS	33	3900	<i>11e+1/1e5</i>	6350	6670	6800	6890	6960	7030	7160	ALPS [11]
AMaLGaM IDEA	27	12	<i>21e+0/1e6</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	AMaLGaM IDEA [4]
BayEDAeG	32	28	<i>89e+0/2e3</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	BayEDAeG [6]
BFGS	<i>51e+4/2e3</i>	1	1.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	BFGS [14]
BIPOP-CMA-ES	1.4	1	1.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1.2	35	<i>63e+0/1e4</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	(1+1)-CMA-ES [2]
DASA	5	463	<i>97e+0/3e5</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	DASA [12]
DEPSO	15	<i>24e+1/2e3</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	DEPSO [7]
iAMaLGaM IDEA	9.6	5.1	<i>28e+0/1e6</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	iAMaLGaM IDEA [4]
(1+1)-ES	1	94	<i>51e+0/1e6</i>	1.5	1.5	1.5	1.5	1.5	1.5	1.5	(1+1)-ES [1]
Monte Carlo	<i>89e+3/1e6</i>	2.2	1	1	1	1	1	1	1	1	Monte Carlo [3]
IPOP-SEP-CMA-ES	1.2	2.2	1	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 13: 40-D, running time excess ERT/ERT_{best} on f_{113} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

113 Step-ellipsoid Gauss												
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}	
ERT_{best}/D	51.8	1430	11000	63500	67400	75000	75000	75000	75000	75100	ERT_{best}/D	
ALPS	2.1	140	<i>10e+1/1e5</i>	2.1	2.1	2.1	2.1	2.1	2.1	2.1	ALPS [11]	
AMaLGaM IDEA	1.9	1.9		2.1	2.1	2.1	2.1	2.1	2.1	2.1	AMaLGaM IDEA [4]	
BayEDAeG	4	<i>18e+1/2e3</i>									BayEDAeG [6]	
BFGS											BFGS [14]	
BIPOP-CMA-ES	2	1		1	1	1	1	1	1	1	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	870	<i>11e+2/1e4</i>									(1+1)-CMA-ES [2]	
DASA	3200	<i>89e+1/2e5</i>									DASA [12]	
DEPSO	120	<i>13e+2/2e3</i>									DEPSO [7]	
iAMaLGaM IDEA	1	3.6	15	5.1	5.3	5.1	5.1	5.1	5.1	5.1	iAMaLGaM IDEA [4]	
(1+1)-ES	1900	<i>72e+1/1e6</i>									(1+1)-ES [1]	
Monte Carlo	24	<i>52e+1/1e6</i>									Monte Carlo [3]	
IPOP-SEP-CMA-ES	59	<i>51e+1/1e4</i>									IPOP-SEP-CMA-ES [13]	

Table 14: 40-D, running time excess ERT_{best} on f_{114} , in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

114 Step-ellipsoid unif											
Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}
ERT_{best}/D	165	7220	42000	1.64e5	2.51e5	2.88e5	2.88e5	2.88e5	2.88e5	2.92e5	ERT_{best}/D
ALPS	2.1	<i>50e+1/1e5</i>	.	.	.	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	1	<i>9</i>	62	<i>12e+0/1e6</i>	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDAeG	12	<i>94e+1/2e3</i>	.	.	.	.	.	.	.	.	BayEDAeG [6]
BFGS	<i>19e+2/700</i>	.	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	2.6	1	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	430	<i>13e+2/1e4</i>	.	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	990	<i>99e+1/2e5</i>	.	.	.	.	.	.	.	.	DASA [12]
DEPSO	<i>20e+2/2e3</i>	.	.	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	10	29	360	<i>19e+0/1e6</i>	.	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1200	<i>74e+1/1e6</i>	.	.	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	11	<i>54e+1/1e6</i>	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	<i>19e+2/1e4</i>	.	.	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 15: 40-D, running time excess ERT/ERT_{best} on f_{115} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

115 Step-ellipsoid Cauchy											
Δf_{target} ERT_{best}/D	$1e+03$ 4.15	$1e+02$ 26.7	$1e+01$ 51.4	$1e+00$ 4860	$1e-01$ 9320	$1e-02$ 10500	$1e-03$ 10500	$1e-04$ 10500	$1e-05$ 10500	$1e-07$ 10500	Δf_{target} ERT_{best}/D
ALPS	8.9	16	<i>41e+0/1e5</i>	.	.	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	11	12	1.1	1	1	1	1	1	1	1	AMaLGaM IDEA [4]
BayEDAcG	14	25	<i>25e+0/2e3</i>	.	.	.	.	.	.	.	BayEDAcG [6]
BFGS	<i>17e+2/2e3</i>	.	.	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1.1	1.8	6.6	4.1	4	4	4	4	4	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1.2	470	<i>10e+1/1e4</i>	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	7.1	<i>17e+1/2e5</i>	.	.	.	.	.	.	.	.	DASA [12]
DEPSO	3.8	24	<i>59e+0/2e3</i>	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	4.9	4.8	1	3.4	4.5	6	6	6	6	5.9	iAMaLGaM IDEA [4]
(1+1)-ES	2.2	2.6e5	<i>12e+1/1e6</i>	.	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	420	<i>53e+1/1e6</i>	.	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1.1	1	1.1	29	15	<i>31e-1/1e4</i>	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 16: 40-D, running time excess ERT/ERT_{best} on f_{116} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

116 Ellipsoid Gauss												
Δf_{target} ERT_{best}/D	$1e+03$ 13100	$1e+02$ 60200	$1e+01$ 1.04e5	$1e+00$ 1.08e5	$1e-01$ 1.13e5	$1e-02$ 1.17e5	$1e-03$ 1.21e5	$1e-04$ 1.25e5	$1e-05$ 1.28e5	$1e-07$ 1.36e5	Δf_{target} ERT_{best}/D	
ALPS	<i>65e+2/1e5</i>	.	.	.	.	.	.	.	.	.	ALPS [11]	
AMaLGaM IDEA	1	1.2	1	1	1	1	1	1	1	1	AMaLGaM IDEA [4]	
BayEDAcG	<i>20e+3/2e3</i>	.	.	.	.	.	.	.	.	.	BayEDAcG [6]	
BFGS	<i>19e+4/500</i>	.	.	.	.	.	.	.	.	.	BFGS [14]	
BIPOP-CMA-ES	1.1	1	1	1.3	1.3	1.3	1.3	1.2	1.2	1.2	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	<i>93e+3/1e4</i>	.	.	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]	
DASA	<i>71e+3/2e5</i>	.	.	.	.	.	.	.	.	.	DASA [12]	
DEPSO	<i>14e+4/2e3</i>	.	.	.	.	.	.	.	.	.	DEPSO [7]	
iAMaLGaM IDEA	6.1	3.2	3.6	3.8	3.7	3.6	3.5	3.4	3.4	3.3	iAMaLGaM IDEA [4]	
(1+1)-ES	<i>49e+3/1e6</i>	.	.	.	.	.	.	.	.	.	(1+1)-ES [1]	
Monte Carlo	<i>37e+3/1e6</i>	.	.	.	.	.	.	.	.	.	Monte Carlo [3]	
IPOP-SEP-CMA-ES	<i>52e+3/1e4</i>	.	.	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]	

Table 17: 40-D, running time excess ERT/ERT_{best} on f_{117} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

117 Ellipsoid unif											
Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}
ERT_{best}/D	31300	1.35e5	2.11e5	2.97e5	3.4e5	3.65e5	4.33e5	4.57e5	4.79e5	5.28e5	ERT_{best}/D
ALPS	<i>31e+3/1e5</i>										ALPS [11]
AMaLGaM IDEa	4.3	11	23	<i>90e+0/1e6</i>							AMaLGaM IDEa [4]
BayEDAeG	<i>58e+3/2e3</i>										BayEDAeG [6]
BFGS	<i>16e+4/400</i>										BFGS [14]
BIPOP-CMA-ES	1	1	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	<i>12e+4/1e4</i>										(1+1)-CMA-ES [2]
DASA	<i>82e+3/2e5</i>										DASA [12]
DEPSO	<i>18e+4/2e3</i>										DEPSO [7]
iAMaLGaM IDEa	14	15	71	<i>13e+1/1e6</i>							iAMaLGaM IDEa [4]
(1+1)-ES	<i>50e+3/1e6</i>										(1+1)-ES [1]
Monte Carlo	<i>37e+3/1e6</i>										Monte Carlo [3]
IPOP-SEP-CMA-ES	<i>14e+4/1e4</i>										IPOP-SEP-CMA-ES [13]

Table 18: 40-D, running time excess $\text{ERT}/\text{ERT}_{\text{best}}$ on f_{118} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

118 Ellipsoid Cauchy												
	$\Delta \text{ftarget}$	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	$\Delta \text{ftarget}$
	$\text{ERT}_{\text{best}}/D$	139	363	980	1200	2050	2410	2720	2920	3110	3290	$\text{ERT}_{\text{best}}/D$
ALPS		35	<i>38e+1/1e5</i>									ALPS [11]
AMaLGaM IDEA		3.5	2.1	1	1	2	3.2	10	16	16	16	AMaLGaM IDEA [4]
BayEDA cG		<i>28e+2/2e3</i>										BayEDA cG [6]
BFGS		<i>16e+4/2e3</i>										BFGS [14]
BIPOP-CMA-ES		1	1.2	1	1.4	1.1	1.1	1.2	1.2	1.3	1.4	BIPOP-CMA-ES [10]
(1+1)-CMA-ES		7.7	<i>46e+1/1e4</i>									(1+1)-CMA-ES [2]
DASA		1.9e4	<i>13e+2/4e5</i>									DASA [12]
DEPSO		<i>24e+2/2e3</i>										DEPSO [7]
iAMaLGaM IDEA		1.6	1	1.8	6.5	7.3	18	23	26	24	23	iAMaLGaM IDEA [4]
(1+1)-ES		8500	<i>96e+1/1e6</i>									(1+1)-ES [1]
Monte Carlo		<i>38e+3/1e6</i>										Monte Carlo [3]
IPOP-SEP-CMA-ES		1.3	1.6	1.1	1.4	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 19: 40-D, running time excess ERT/ERT_{best} on f_{119} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

119 Sum of different powers Gauss												
	Δf_{target}	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}
ERT _{best} /D	ERT _{best} /D	0.025	1.28	1060	3080	3930	13300	53000	1.18e5	2.51e5	3.2e5	ERT _{best} /D
ALPS	1	1.8	1	50	<i>88e-1/1e5</i>	24	8.8	3.9	2.2	1.2	1.3	ALPS [11]
AMaLGaM IDEA	1	1	4.8	17	<i>93e-1/2e3</i>	·	·	·	·	·	·	AMaLGaM IDEA [4]
BayEDAeG	1.1	1.2	2.2	<i>95e+0/1e3</i>	·	·	·	·	·	·	·	BayEDAeG [6]
BFGS	1	670	1	1	1	1	1	1	1	1	1	BFGS [14]
BIPOP-CMA-ES	1	7.7	1	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	180	<i>51e+0/1e4</i>	·	·	·	·	·	·	·	·	(1+1)-CMA-ES [2]
DASA	1	690	<i>43e+0/2e5</i>	·	·	·	·	·	·	·	·	DASA [12]
DEPSO	1.1	8.6	<i>35e+0/2e3</i>	·	·	·	·	·	·	·	·	DEPSO [7]
iAMaLGaM IDEA	1	2.7	5.5	57	84	27	7	3.2	1.5	1.5	1.5	iAMaLGaM IDEA [4]
(1+1)-ES	1.7	72	<i>36e+0/1e6</i>	·	·	·	·	·	·	·	·	(1+1)-ES [1]
Monte Carlo	1	1.2	<i>28e+0/1e6</i>	·	·	·	·	·	·	·	·	Monte Carlo [3]
IPOP-SEP-CMA-ES	4.1	4	<i>26e+0/1e4</i>	·	·	·	·	·	·	·	·	IPOP-SEP-CMA-ES [13]

Table 20: 40-D, running time excess ERT/ERT_{best} on f_{120} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δft_{target}
ERT _{best} /D	0.025	1.02	4090	17700	43300	84100	2.84e5	6.09e5	1.08e6	5.96e6	ERT _{best} /D
ALPS	1	1	<i>23e+0/1e5</i>	.	.	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	1	2.8	17	<i>30e-1/1e6</i>	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDA cG	1	1.2	<i>53e+0/2e3</i>	.	.	.	.	.	.	.	BayEDA cG [6]
BFGS	3.7	550	<i>82e+0/800</i>	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	68	1	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	400	<i>61e+0/1e4</i>	.	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	1200	<i>47e+0/2e5</i>	.	.	.	.	.	.	.	DASA [12]
DEPSO	1	1300	<i>95e+0/2e3</i>	.	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	5.4	64	<i>48e-1/1e6</i>	.	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1	220	<i>39e+0/1e6</i>	.	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1	1.9	<i>29e+0/1e6</i>	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	1500	<i>61e+0/1e4</i>	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 21: 40-D, running time excess ERT/ERT_{best} on f_{121} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

121 Sum of different powers Cauchy											
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT_{best}/D	0.025	1.4	18.2	43.5	84	205	689	1430	2430	5040	ERT_{best}/D
ALPS	1	1	1600	<i>84e-1/1e5</i>	37	130	72	35	21	11	ALPS [11]
AMaLGaM IDEA	1	1.8	14	13	<i>38e-2/2e3</i>	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDA cG	1	2.3	33	35	<i>38e-2/2e3</i>	.	.	.	.	.	BayEDA cG [6]
BFGS	1	1600	<i>92e+0/2e3</i>	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1.8	1.1	1.1	1.1	1	1	1.3	1.6	2	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1.9	2400	<i>14e+0/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	35	<i>27e+0/2e5</i>	.	.	.	.	.	.	.	DASA [12]
DEPSO	1.1	3.4	28	<i>54e-1/2e3</i>	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	1.5	8.3	28	100	310	130	100	110	65	iAMaLGaM IDEA [4]
(1+1)-ES	1	2.7	4.8e4	<i>95e-1/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1.1	1.2	<i>28e+0/1e6</i>	.	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	2.2	1	1	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]

Table 22: 40-D, running time excess ERT/ERT_{best} on $f_{1,22}$, in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

122 Schaffer F7 Gauss											
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT_{best}/D	0.025	0.025	1.23	6830	16100	26800	70200	$1.12e5$	$3.02e5$	$8.23e5$	ERT_{best}/D
ALPS	1	1	7.9	<i>58e-1/1e5</i>	25	22	13	14	<i>11e-5/1e6</i>	.	ALPS [11]
AMaLGaM IDEA	1	1.3	1.6	29	.	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDAacG	1	1	3.1	<i>59e-1/2e3</i>	.	.	.	.	.	.	BayEDAacG [6]
BFGS	1	37	<i>18e+0/1e3</i>	.	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	4.3	1.8	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1.8	1200	<i>13e+0/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	11	<i>12e+0/2e5</i>	.	.	.	.	.	.	.	DASA [12]
DEPSO	1	1.1	53	<i>12e+0/2e3</i>	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	1	1	51	60	39	15	13	50	<i>49e-6/1e6</i>	iAMaLGaM IDEA [4]
(1+1)-ES	1	60	1.5e4	<i>10e+0/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1	1.2	1200	<i>88e-1/1e6</i>	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	1	110	<i>99e-1/1e4</i>	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 23: 40-D, running time excess ERT/ERT_{best} on f_{123} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

123 Schaffer F7 unif												
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}	
ERT_{best}/D	0.025	0.025	331	59200	$2.36e5$	$3.88e5$	$5.98e5$	$9.4e5$	$5.67e6$	$1.83e7$	ERT_{best}/D	
ALPS	1	1.5	20	<i>82e-1/1e5</i>	.	.	.	.	.	.	ALPS [11]	
iAMaLGaM IDEA	1	1.3	1	<i>43e-1/1e6</i>	.	.	.	.	.	.	iAMaLGaM IDEA [4]	
BayEDAeG	1	1.1	<i>13e+0/2e3</i>	.	.	.	.	.	.	.	BayEDAeG [6]	
BFGS	1	28	<i>18e+0/900</i>	.	.	.	.	.	.	.	BFGS [14]	
BIPOP-CMA-ES	1	2.2	3.3	1	1	1	1	1	1	1	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	1	1	430	<i>14e+0/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]	
DASA	1	9.9	<i>12e+0/2e5</i>	.	.	.	.	.	.	.	DASA [12]	
DEPSO	1	1.1	<i>20e+0/2e3</i>	.	.	.	.	.	.	.	DEPSO [7]	
iAMaLGaM IDEA	1	1.1	11	<i>46e-1/1e6</i>	.	.	.	.	.	.	iAMaLGaM IDEA [4]	
(1+1)-ES	1	34	<i>1.4e4</i>	<i>11e+0/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]	
Monte Carlo	1	1.2	470	<i>88e-1/1e6</i>	.	.	.	.	.	.	Monte Carlo [3]	
IPOP-SEP-CMA-ES	1	1	<i>13e+0/1e4</i>	.	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]	

Table 24: 40-D, running time excess ERT_{best} on f_{124} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

124 Schaffer F7 Cauchy												
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}	
ERT_{best}/D	0.025	0.025	14.3	754	5310	6580	9160	20500	28600	56000	ERT_{best}/D	
ALPS	1	1.2	13	<i>59e-1/1e5</i>								ALPS [11]
AMaLGaM IDEA	1	1.1	9.9	1.4	5.4	4.6	3.5	1.6	1.3	1		AMaLGaM IDEA [4]
BayEDAeG	1	1.1	20	5.2	<i>11e-1/2e3</i>							BayEDAeG [6]
BFGS	1	180	<i>17e+0/2e3</i>									BFGS [14]
BIPOP-CMA-ES	1	4.1	1	1	1	1	1	1	1	1		BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	500	<i>95e-1/1e4</i>								(1+1)-CMA-ES [2]
DASA	1	1.3	1.6e5	<i>11e+0/2e5</i>								DASA [12]
DEPSO	1	1.3	8.2	<i>58e-1/2e3</i>								DEPSO [7]
iAMaLGaM IDEA	1	1.3	4.6	3.5	16	27	19	8.8	6.4	3.3		iAMaLGaM IDEA [4]
(1+1)-ES	1	4.2	4600	<i>84e-1/1e6</i>								(1+1)-ES [1]
Monte Carlo	1	1.4	1.2e4	<i>89e-1/1e6</i>								Monte Carlo [3]
IPOP-SEP-CMA-ES	1	3.1	1	3.2	1.4	1.5	2.5	<i>16e-4/1e4</i>				IPOP-SEP-CMA-ES [13]

Table 25: 40-D, running time excess ERT/ERT_{best} on $f_{1.25}$, in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

125 Griewank-Rosenbrock Gauss											
Δf_{target} ERT _{best} /D	1e+03 0.025	1e+02 0.025	1e+01 0.025	1e+00 1.15	1e-01 2.64e6	1e-02 2.74e6	1e-03 1.36e7	1e-04 nan	1e-05 nan	1e-07 nan	Δf_{target} ERT _{best} /D
ALPS	1	1	1.2	1.8	<i>64e-2/1e5</i>	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	1	1	1	1.4	<i>44e-2/1e6</i>	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDAcG	1	1	1.1	2	<i>69e-2/2e3</i>	.	.	.	.	.	BayEDAcG [6]
BFGS	1	1	1	<i>28e-1/2e3</i>	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1	1	1.8	1	1	1	<i>41e-2/7e5</i>	.	.	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	1	<i>15e-1/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	1	7.1	<i>20e-1/2e5</i>	.	.	.	.	.	.	DASA [12]
DEPSO	1	1	1	240	<i>12e-1/2e3</i>	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	1	1	1	<i>44e-2/1e6</i>	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1	1	3.5	<i>15e-1/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1	1	1	<i>14e-1/1e6</i>	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	1	1	1300	<i>11e-1/1e4</i>	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 26: 40-D, running time excess ERT/ERT_{best} on f_{126} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

Δf_{target} ERT_{best}/D	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target} ERT_{best}/D
	0.025	0.025	0.025	218	nan	nan	nan	nan	nan	nan	
ALPS	1	1	1.1	10	<i>81e-2/1e5</i>	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	1	1	1.1	1	<i>50e-2/1e6</i>	.	.	.	.	.	AMaLGaM IDEA [4]
BayEDA _{cG}	1	1	1.1	<i>12e-1/2e3</i>	.	.	.	.	.	.	BayEDA _{cG} [6]
BFGS	1	1	28	<i>29e-1/1e3</i>	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1	1	2.8	<i>50e-2/4e5</i>	.	.	.	.	.	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	1	<i>16e-1/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	1	1	<i>20e-1/2e5</i>	.	.	.	.	.	.	DASA [12]
DEPSO	1	1	1.1	<i>23e-1/2e3</i>	.	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	1	1	4.3	<i>51e-2/1e6</i>	.	.	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1	1	1	<i>16e-1/1e6</i>	.	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1	1	1.1	<i>14e-1/1e6</i>	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	1	1	<i>17e-1/1e4</i>	.	.	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 27: 40-D, running time excess ERT/ERT_{best} on f_{127} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

127 Griewank-Rosenbrock Cauchy											
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}
ERT_{best}/D	0.025	0.025	0.025	17.6	44700	$2.63e5$	$3.78e5$	$6.24e5$	$6.49e5$	$6.66e5$	ERT_{best}/D
ALPS	1	1	1.1	7.1	<i>70e-2/1e5</i>	.	.	.	.	.	ALPS [11]
AMaLGaM IDEA	1	1	1	7	2.3	56	<i>19e-3/1e6</i>	.	.	.	AMaLGaM IDEA [4]
BayEDAcG	1	1	1.2	13	<i>59e-2/2e3</i>	.	.	.	.	.	BayEDAcG [6]
BFGS	1	1	300	<i>28e-1/2e3</i>	.	.	.	.	.	.	BFGS [14]
BIPOP-CMA-ES	1	1	1	1	2.4	1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	1	<i>13e-1/1e4</i>	.	.	.	.	.	.	(1+1)-CMA-ES [2]
DASA	1	1	1	<i>20e-1/2e5</i>	.	.	.	.	.	.	DASA [12]
DEPSO	1	1	1	53	<i>95e-2/2e3</i>	.	.	.	.	.	DEPSO [7]
iAMaLGaM IDEA	1	1	1.2	4	3.5	8.7	<i>11e-3/1e6</i>	.	.	.	iAMaLGaM IDEA [4]
(1+1)-ES	1	1	1	8.4e5	<i>11e-1/1e6</i>	.	.	.	.	.	(1+1)-ES [1]
Monte Carlo	1	1	1.1	<i>15e-1/1e6</i>	.	.	.	.	.	.	Monte Carlo [3]
IPOP-SEP-CMA-ES	1	1	1	1.1	1	<i>16e-2/1e4</i>	.	.	.	.	IPOP-SEP-CMA-ES [13]

Table 28: 40-D, running time excess ERT/ERT

Table 29: 40-D, running time excess ERT/ERT_{best} on f_{129} , in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

129 Gallagher unif													
	Δf_{target}	ERT_{best}/D	1e+03	1e+02	1e+01	1e+00	1e-01	1e-02	1e-03	1e-04	1e-05	1e-07	Δf_{target}
	ERT_{best}/D		0.025	0.025	8.67e5	9.4e5	2.54e6	2.55e6	2.56e6	2.58e6	2.59e6	2.62e6	ERT_{best}/D
ALPS		1	1	1	<i>70e+0/1e5</i>								ALPS [11]
AMaLGaM IDEA	1	1	1	1	<i>66e+0/1e6</i>								AMaLGaM IDEA [4]
BayEDAacG	1	1	1	1	<i>81e+0/2e8</i>								BayEDAacG [6]
BFGS	1	1	1	1	<i>84e+0/800</i>								BFGS [14]
BIPOP-CMA-ES	1	1	1	1	1			1	1	1	1	1	BIPOP-CMA-ES [10]
(1+1)-CMA-ES	1	1	1	1									(1+1)-CMA-ES [2]
DASA	1	1	1	1									DASA [12]
DEPSO	1	1	1	1									DEPSO [7]
			1	1									(1+1)-ES [1]
IPOP-SEP-CMA-ES	1	1	1	1									IPOP-SEP-CMA-ES [13]

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Table 30: 40-D, running time excess ERT/ERT_{best} on $f_{1.30}$, in italics is given the median function value and the median number of function evaluations to reach this value divided by dimension

130 Gallagher Cauchy												
Δf_{target}	$1e+03$	$1e+02$	$1e+01$	$1e+00$	$1e-01$	$1e-02$	$1e-03$	$1e-04$	$1e-05$	$1e-07$	Δf_{target}	
ERT_{best}/D	0.025	0.025	317	6930	42100	42200	42200	42300	42400	42500	ERT_{best}/D	
ALPS	1	1	<i>$42e+0/1e5$</i>	·	95	·	95	·	·	·	ALPS [11]	
AMaLGaM IDEA	1	1	7.5	100	95	·	95	95	95	95	AMaLGaM IDEA [4]	
BayEDAcG	1	1	3.8	1	<i>$17e-1/2e3$</i>	·	·	·	·	·	BayEDAcG [6]	
BFGS	1	1	<i>$83e+0/2e3$</i>	·	·	·	·	·	·	·	BFGS [14]	
BIPOP-CMA-ES	1	1	1	24	7.9	7.9	7.9	7.9	7.9	7.9	BIPOP-CMA-ES [10]	
(1+1)-CMA-ES	1	1	<i>$47e+0/1e4$</i>	·	·	·	·	·	·	·	(1+1)-CMA-ES [2]	
DASA	1	1	<i>$75e+0/2e5$</i>	·	·	·	·	·	·	·	DASA [12]	
DEPSO	1	1	12	<i>$20e+0/2e3$</i>	·	·	·	·	·	·	DEPSO [7]	
iAMaLGaM IDEA	1	1	3.4	66	40	50	68	70	97	97	iAMaLGaM IDEA [4]	
(1+1)-ES	1	1	<i>$2.2e4$</i>	·	·	·	·	·	·	·	(1+1)-ES [1]	
Monte Carlo	1	1	<i>$68e+0/1e6$</i>	·	·	·	·	·	·	·	Monte Carlo [3]	
IPOP-SEP-CMA-ES	1	1	1	1.6	1	1	1	1	1	1	IPOP-SEP-CMA-ES [13]	

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