SUPPLEMENTARY MATERIAL

No Author Given

No Institute Given

Table 1. The algebraic degree upper bounds of $\mathsf{Yu_2X}$-16 in multivariate setting

Cipher	Input index	Output index	Rounds											
			0	1	2	3	4	5	6	7	8	9	10	11
$\mathsf{Yu_2X}$-16	(0,4,8)	0/1	1	1	2	6	12	18	24	30	36	42	**48**	-
		2	1	1	3	8	14	20	26	32	38	44	**48**	-
		3	1	1	3	9	15	21	27	33	39	45	**48**	-
	(0,4,8,12)	0/1	1	1	2	6	14	22	30	38	46	54	62	**64**
		2	1	1	3	9	17	25	33	41	49	57	**64**	-
		3	1	1	3	11	18	26	34	42	50	58	**64**	-
	(0,1,4,8,12)	0	1	1	2	8	16	26	36	46	56	66	76	**80**
		1	1	1	3	8	17	27	37	47	57	67	77	**80**
		2	1	1	4	11	20	30	40	50	60	70	**80**	-
		3	1	2	4	12	21	31	41	51	61	71	**80**	-
	(0,1,3,4,8,12)	0	1	1	3	8	16	26	36	48	60	72	84	**96**
		1	1	1	3	8	17	27	37	49	61	73	85	**96**
		2	1	2	4	11	20	30	42	54	66	78	90	**96**
		3	1	2	5	12	21	31	43	55	67	79	91	**96**
	(0,1,3,4,6,8,12)	0	1	1	3	10	20	34	48	62	76	90	104	**112**
		1	1	1	4	10	20	34	48	62	76	90	104	**112**
		2	1	2	5	13	24	38	52	66	80	94	108	**112**
		3	1	2	5	13	24	38	52	66	80	94	108	**112**

Table 2. The algebraic degree upper bounds of $\mathsf{Yu_2X}$-8 in multivariate setting

Cipher	In	Out	Rounds								
			0	1	2	3	4	5	6	7	8
Yu₂X-8	(0,4,8)	0/1	1	1	2	6	12	18	**24**	-	-
		2	1	1	3	8	14	20	**24**	-	-
		3	1	1	3	9	15	21	**24**	-	-
	(0,4,8,12)	0/1	1	1	2	6	14	22	30	**32**	-
		2	1	1	3	9	17	25	**32**	-	-
		3	1	1	3	11	18	26	**32**	-	-
	(0,1,4,8,12)	0	1	1	2	8	16	26	36	**40**	-
		1	1	1	3	8	17	27	37	**40**	-
		2	1	1	4	11	20	30	**40**	-	-
		3	1	2	4	12	21	31	**40**	-	-
	(0,1,3,4,8,12)	0	1	1	3	8	17	29	41	**48**	-
		1	1	1	3	8	17	29	41	**48**	-
		2	1	2	4	11	22	34	46	**48**	-
		3	1	2	5	12	23	33	47	**48**	-
	(0,1,3,4,6,8,12)	0	1	1	3	10	20	34	48	**56**	-
		1	1	1	4	10	20	34	48	**56**	-
		2	1	2	5	13	24	38	52	**56**	-
		3	1	2	5	13	24	38	52	**56**	-
	(0,1,4,5,8,9,12,13)	0	1	1	4	12	21	37	53	**64**	-
		1	1	1	4	12	21	37	53	**64**	-
		2	1	1	6	16	32	48	**64**	-	-
		3	1	2	6	17	33	49	**64**	-	-
	(0,1,3,4,5,8,9,12,13)	0	1	1	4	12	22	40	58	**72**	-
		1	1	1	4	12	22	40	58	**72**	-
		2	1	2	6	18	36	54	**72**	-	-
		3	1	2	6	18	36	54	**72**	-	-
	(0,1,3,4,5,8,9,12,13,15)	0	1	1	4	12	23	43	63	**80**	-
		1	1	1	4	12	23	43	63	**80**	-
		2	1	2	6	18	38	58	78	**80**	-
		3	1	2	6	18	38	58	78	**80**	-
	(0,1,3,4,5,7,8,9,12,13,15)	0	1	1	4	12	24	46	68	**88**	-
		1	1	1	4	12	24	46	68	**88**	-
		2	1	2	6	18	30	52	74	**88**	-
		3	1	2	6	18	30	52	74	**88**	-
	(0,1,3,4,5,7,8,9,11,12,13,15)	0	1	1	4	12	26	50	74	**96**	-
		1	1	1	4	12	26	50	74	**96**	-
		2	1	2	6	19	43	67	91	**96**	-
		3	1	2	6	19	43	67	91	**96**	-
	(0,1,2,3,4,5,7,8,9,11,12,13,15)	0	1	2	5	14	28	54	80	**104**	-
		1	1	2	5	14	28	54	80	**104**	-
		2	1	3	7	21	47	73	99	**104**	-
		3	1	3	8	22	48	74	100	**104**	-
	(0,1,2,3,4,5,6,7,8,9,11,12,13,15)	0	1	2	5	16	30	58	86	**112**	-
		1	1	2	5	16	30	58	86	**112**	-
		2	1	3	8	24	52	80	108	**112**	-
		3	1	3	8	24	52	80	108	**112**	-
	(0,1,2,3,4,5,6,7,8,9,10,11,12,13,15)	0	1	2	6	17	36	66	96	126	**128**
		1	1	2	6	17	36	66	96	128	**128**
		2	1	2	9	26	56	86	116	**128**	-
		3	1	2	9	26	56	86	116	**128**	-