

Supporting Information

Table I. Observed and calculated Zeeman shifts for the lines of the for (0,0) band of $A^2\Pi_{1/2} - X^2\Sigma^+$ band system of ^{171}YbF , ^{172}YbF and ^{171}YbF (cm^{-1}).

isotopologue	Branch, Pol.	Field (Guass)	$F'-F''$	$M_{F'}$	$M_{F''}$	Shift (MHz)	
						Observed	Obs.-Calc.
^{171}YbF	$^{\circ}P_{12}(2), //$	236.8		-1.50	-1.50	-77.00	2.02
				-0.50	-0.50	-67.00	3.78
				-0.50	-0.50	16.00	-4.96
				0.50	0.50	26.00	-3.45
				0.50	0.50	114.90	11.99
				1.50	1.50	124.90	13.96
		467.5		-1.50	-1.50	-127.90	-2.36
				-0.50	-0.50	-117.90	-8.64
				-0.50	-0.50	90.90	2.40
				0.50	0.50	100.90	-4.47
				0.50	0.50	237.80	4.23
				1.50	1.50	247.80	-1.84
		543.3		-1.50	-1.50	-144.90	-10.50
				-0.50	-0.50	-124.90	-9.34
				-0.50	-0.50	103.90	-16.44
				0.50	0.50	123.90	-15.98
				0.50	0.50	283.80	0.87
				1.50	1.50	303.80	2.23
		640.8		-1.50	-1.50	-141.90	-0.65
				-0.50	-0.50	-121.90	-2.72
				-0.50	-0.50	159.40	-8.51
				0.50	0.50	179.40	-11.42
				0.50	0.50	346.80	-4.18
				1.50	1.50	366.80	-6.05
		759.1		-1.50	-1.50	-144.90	-2.03
				-0.50	-0.50	-124.90	-7.89
				-0.50	-0.50	232.80	-2.37
				0.50	0.50	252.80	-9.24
				0.50	0.50	448.70	8.45
				1.50	1.50	468.70	2.79
	$^{\circ}P_{12}(3), //$	462.9		-2.50	-2.50	-139.90	6.61
				-1.50	-1.50	-129.90	1.23
				-1.50	-1.50	-35.00	5.05
				-0.50	-0.50	-25.00	-1.20
				-0.50	-0.50	43.00	-19.15
				0.50	0.50	53.00	-25.61
		640.8		0.50	0.50	159.90	-0.14
				1.50	1.50	169.90	-6.19
				1.50	1.50	234.80	-18.33
				2.50	2.50	244.80	-23.28
				-2.50	-2.50	-162.90	8.29
				-1.50	-1.50	-142.90	7.24
				-1.50	-1.50	-7.00	13.14

645.4	-0.50	-0.50	13.00	10.86
	-0.50	-0.50	136.90	14.30
	0.50	0.50	156.90	11.68
	0.50	0.50	271.80	14.63
	1.50	1.50	291.80	12.53
	1.50	1.50	391.70	9.67
	2.50	2.50	411.70	9.02
	-2.50	-2.50	-179.40	-7.80
	-1.50	-1.50	-164.40	-13.98
	-1.50	-1.50	-15.50	3.88
	-0.50	-0.50	6.50	3.44
	-0.50	-0.50	128.40	3.98
	0.50	0.50	150.40	3.20
	0.50	0.50	260.30	0.36
	1.50	1.50	279.30	-2.89
	1.50	1.50	395.70	10.01
759.1	2.50	2.50	421.20	14.82
	-2.50	-2.50	-162.90	15.46
	-1.50	-1.50	-142.90	10.80
	-1.50	-1.50	-1.00	-4.47
	-0.50	-0.50	19.00	-10.61
	-0.50	-0.50	190.80	17.28
	0.50	0.50	210.80	10.73
	0.50	0.50	334.80	2.49
	1.50	1.50	354.80	-3.47
	1.50	1.50	475.70	-1.34
	2.50	2.50	495.70	-5.62
	-2.50	-2.50	-167.90	11.37
	-1.50	-1.50	-134.90	18.00
	-1.50	-1.50	14.50	-3.32
	-0.50	-0.50	47.00	1.23
	-0.50	-0.50	194.40	-6.81
816.5	0.50	0.50	219.30	-10.32
	0.50	0.50	369.70	-2.01
	1.50	1.50	384.20	-15.29
	1.50	1.50	524.10	-1.62
	2.50	2.50	544.60	-7.12
	-2.50	-2.50	-176.80	2.47
	-1.50	-1.50	-143.90	8.86
	-1.50	-1.50	23.00	3.92
	-0.50	-0.50	43.00	-4.18
	-0.50	-0.50	197.90	-5.67
	0.50	0.50	227.80	-4.32
	0.50	0.50	359.80	-15.22
	1.50	1.50	398.70	-4.25
	1.50	1.50	518.60	-11.18
	2.50	2.50	554.60	-1.32
821.2	-2.50	-2.50	-174.90	3.68
	-1.50	-1.50	-164.90	-14.33
	-1.50	-1.50	35.00	1.34
872.7				

		-0.50	-0.50	55.00	-8.36
		-0.50	-0.50	233.80	3.63
		0.50	0.50	257.80	-2.56
		0.50	0.50	413.70	1.58
		1.50	1.50	443.70	2.05
		1.50	1.50	563.60	-11.38
		2.50	2.50	593.60	-9.03
	881.9	-2.50	-2.50	-186.90	-8.58
		-1.50	-1.50	-166.90	-16.86
		-1.50	-1.50	38.00	1.58
		-0.50	-0.50	58.00	-8.40
		-0.50	-0.50	241.80	6.71
		0.50	0.50	261.80	-3.76
		0.50	0.50	416.70	-2.21
		1.50	1.50	452.70	3.98
		1.50	1.50	572.60	-7.60
		2.50	2.50	611.60	0.49
${}^oP_{12}(4), //$	640.8	-3.50	-3.50	-174.90	8.29
		-2.50	-2.50	-154.90	7.91
		-2.50	-2.50	-84.90	-2.80
		-1.50	-1.50	-64.90	--4.41
		-1.50	-1.50	8.90	-8.20
		-0.50	-0.50	28.90	-10.48
		-0.50	-0.50	112.90	-1.52
		0.50	0.50	132.90	-3.96
		0.50	0.50	211.80	1.95
		1.50	1.50	231.80	-0.14
		1.50	1.50	301.80	-1.51
		2.50	2.50	321.80	-2.74
		2.50	2.50	379.70	-14.99
		3.50	3.50	399.70	-14.76
	759.1	-3.50	-3.50	-184.90	7.72
		-2.50	-2.50	-164.90	3.83
		-2.50	-2.50	-73.00	-1.34
		-1.50	-1.50	-53.00	--6.69
		-1.50	-1.50	46.30	-0.26
		-0.50	-0.50	66.30	-6.42
		-0.50	-0.50	175.90	13.79
		0.50	0.50	195.90	7.43
		0.50	0.50	286.80	11.83
		1.50	1.50	306.80	5.86
		1.50	1.50	367.70	-17.33
		2.50	2.50	387.70	-22.31
		2.50	2.50	473.30	-18.72
		3.50	3.50	493.30	-22.02
${}^oP_{12}(2), \perp$	236.8	-1.50	-0.50	-68.00	11.51
		-1.50	-2.50	-68.00	9.93
		-0.50	0.50	-58.00	13.23
		-0.50	-1.50	-58.00	12.72
		-0.50	0.50	25.00	4.45

	-0.50	-1.50	25.00	3.34
	0.50	1.50	35.00	6.42
	0.50	-0.50	35.00	5.09
	0.50	1.50	121.90	19.08
	0.50	-0.50	121.90	18.58
	1.50	2.50	111.90	2.03
	1.50	0.50	111.90	0.09
350.4	-1.50	-2.50	-103.90	2.80
	-1.50	-2.50	-103.90	0.15
	-0.50	0.50	-93.90	0.14
	-0.50	-1.50	-93.90	-0.49
	-0.50	0.50	59.90	11.98
	-0.50	-1.50	59.90	10.29
	0.50	1.50	69.90	9.95
	0.50	-0.50	69.90	8.05
	0.50	1.50	167.40	4.09
	0.50	-0.50	167.40	3.24
	1.50	2.50	177.40	3.60
	1.50	0.50	177.40	0.58
466.4	-1.50	-2.50	-127.90	-1.13
	-1.50	-2.50	-127.90	-4.58
	-0.50	0.50	-117.90	-7.97
	-0.50	-1.50	-117.90	-8.67
	-0.50	0.50	93.90	6.71
	-0.50	-1.50	93.90	4.45
	0.50	1.50	103.90	0.68
	0.50	-0.50	103.90	-1.80
	0.50	1.50	234.80	2.30
	0.50	-0.50	234.80	1.04
	1.50	2.50	244.80	-1.64
	1.50	0.50	244.80	-5.79
543.3	-1.50	-2.50	-132.90	3.09
	-1.50	-2.50	-132.90	-0.86
	-0.50	0.50	-112.90	3.54
	-0.50	-1.50	-112.90	2.82
	-0.50	0.50	118.90	-0.38
	-0.50	-1.50	118.90	-3.03
	0.50	1.50	138.90	0.97
	0.50	-0.50	138.90	-1.87
	0.50	1.50	289.80	7.37
	0.50	-0.50	289.80	5.82
	1.50	2.50	309.80	11.18
	1.50	0.50	309.80	6.27
640.8	-1.50	-2.50	-138.90	4.19
	-1.50	-2.50	-138.90	-0.34
	-0.50	0.50	-118.90	1.28
	-0.50	-1.50	-118.90	0.56
	-0.50	0.50	160.90	-5.74
	-0.50	-1.50	160.90	-8.85
	0.50	1.50	180.90	-7.62

${}^oP_{12}(3), \perp$	466.4	0.50	-0.50	180.90	-10.92
		0.50	1.50	343.80	-6.50
		0.50	-0.50	289.80	-8.44
		1.50	2.50	309.80	-5.48
		1.50	0.50	309.80	-11.35
		-2.50	-1.50	-139.90	8.78
		-2.50	-3.50	-139.90	5.39
		-1.50	-0.50	-129.90	2.41
		-1.50	-2.50	-129.90	1.57
		-1.50	-0.50	-29.00	12.11
		-1.50	-2.50	-29.00	9.32
		-0.50	0.50	-19.00	5.52
		-0.50	-1.50	-19.00	3.84
		-0.50	0.50	75.90	13.79
		-0.50	-1.50	75.90	11.49
		0.50	1.50	85.90	7.62
		0.50	-0.50	85.90	5.12
		0.50	1.50	177.90	16.94
		0.50	-0.50	177.90	15.10
		1.50	2.50	187.90	11.88
543.3		1.50	0.50	187.90	8.51
		1.50	2.50	270.80	15.83
		1.50	0.50	270.80	14.50
		2.50	3.50	280.80	12.26
		2.50	1.50	280.80	8.32
		-2.50	-3.50	-147.90	13.62
		-2.50	-3.50	-147.90	14.73
		-1.50	-0.50	-132.90	9.61
		-1.50	-2.50	-127.90	13.72
		-1.50	-0.50	-21.90	12.98
		-1.50	-2.50	-16.90	14.77
		-0.50	0.50	-6.90	8.69
		-0.50	-1.50	-1.90	11.80
		-0.50	0.50	91.90	6.09
		-0.50	-1.50	96.90	8.41
		0.50	1.50	106.90	2.28
		0.50	-0.50	110.90	4.40
		0.50	1.50	214.80	14.22
		0.50	-0.50	219.80	17.04
${}^oP_{12}(4), \perp$	350.4	1.50	2.50	229.80	11.67
		1.50	0.50	234.80	12.75
		1.50	2.50	302.80	-5.80
		1.50	0.50	302.80	-7.44
		2.50	3.50	329.80	5.42
		2.50	1.50	329.80	0.75
		-3.50	-2.50	-121.90	7.79
		-3.50	-4.50	-121.90	5.29
		-2.50	-1.50	-111.90	5.86
		-2.50	-3.50	-111.90	4.98
		-2.50	-1.50	-71.00	4.62

	-2.50	-3.50	-71.00	2.42
	-1.50	-0.50	-61.00	2.37
	-1.50	-2.50	-61.00	1.13
	-1.50	-0.50	-17.00	5.06
	-1.50	-2.50	-17.00	3.11
	-0.50	0.50	-7.00	2.77
	-0.50	-1.50	-7.00	1.18
	-0.50	-0.50	40.00	9.01
	-0.50	-1.50	40.00	7.29
	0.50	1.50	50.00	6.96
	0.50	-0.50	50.00	5.03
	0.50	1.50	81.90	-1.63
	0.50	-0.50	81.90	-3.14
	1.50	2.50	91.90	-3.14
	1.50	0.50	91.90	-5.43
	1.50	2.50	126.90	-8.66
	1.50	0.50	126.90	-9.93
	2.50	3.50	136.90	-9.30
	2.50	1.50	136.90	-11.98
	2.50	3.50	171.90	-15.20
	2.50	1.50	171.90	-16.19
	3.50	4.50	181.90	-15.13
	3.50	2.50	181.90	-17.70
462.9	3.50	2.50	-154.90	1.76
	-3.50	-4.50	-154.90	-1.48
	-2.50	-1.50	-144.90	-3.99
	-2.50	-3.50	-144.90	-5.02
	-2.50	-1.50	-95.90	-11.33
	-2.50	-3.50	-95.90	-14.20
	-1.50	-0.50	-85.90	-17.54
	-1.50	-2.50	-85.90	-19.09
	-1.50	-0.50	-11.00	2.42
	-1.50	-2.50	-11.00	-0.15
	-0.50	0.50	-1.00	-3.88
	-0.50	-1.50	-1.00	-5.90
	-0.50	-0.50	67.00	10.22
	-0.50	-1.50	67.00	7.91
	0.50	1.50	77.00	4.20
	0.50	-0.50	77.00	1.70
	0.50	1.50	120.90	-5.14
	0.50	-0.50	120.90	-7.18
	1.50	2.50	130.90	-10.49
	1.50	0.50	130.90	-13.48
	1.50	2.50	198.80	4.45
	1.50	0.50	198.80	2.70
	2.50	3.50	208.80	0.21
	2.50	1.50	208.80	-3.32
	2.50	3.50	261.80	0.11
	2.50	1.50	261.80	-1.30
	3.50	4.50	271.80	-3.07

543.3	3.50	2.50	271.80	-6.65
	3.50	2.50	-171.90	-0.22
	-3.50	-4.50	-166.90	1.03
	-2.50	-1.50	-156.90	-3.65
	-2.50	-3.50	-151.90	0.22
	-2.50	-1.50	-87.90	-1.40
	-2.50	-3.50	-82.90	0.26
	-1.50	-0.50	-72.90	-5.39
	-1.50	-2.50	-67.90	-2.13
	-1.50	-0.50	-1.00	1.65
	-1.50	-2.50	4.00	3.66
	-0.50	0.50	14.00	-2.45
	-0.50	-1.50	19.00	0.23
	-0.50	-0.50	76.90	-2.95
	-0.50	-1.50	81.90	-0.65
	0.50	1.50	91.90	-6.75
	0.50	-0.50	96.90	-4.64
	0.50	1.50	151.90	-9.12
	0.50	-0.50	156.90	-6.54
	1.50	2.50	166.90	-12.16
	1.50	0.50	171.90	-10.64
	1.50	2.50	232.80	-8.04
	1.50	0.50	237.80	-5.14
	2.50	3.50	247.80	-9.81
	2.50	1.50	252.80	--8.94
	2.50	3.50	313.80	-5.45
	2.50	1.50	318.80	-2.19
	3.50	4.50	328.80	-5.92
	3.50	2.50	333.80	-5.23
640.8	3.50	2.50	-186.90	-1.68
	-3.50	-4.50	-181.90	-1.01
	-2.50	-1.50	-171.90	-8.29
	-2.50	-3.50	-166.90	-4.50
	-2.50	-1.50	-79.00	4.93
	-2.50	-3.50	-64.00	16.07
	-1.50	-0.50	-54.00	7.65
	-1.50	-2.50	-59.00	0.69
	-1.50	-0.50	23.00	7.57
	-1.50	-2.50	28.00	9.07
	-0.50	0.50	38.00	0.13
	-0.50	-1.50	43.00	2.46
	-0.50	-0.50	121.90	8.99
	-0.50	-1.50	126.90	10.81
	0.50	1.50	136.90	1.89
	0.50	-0.50	141.90	3.53
	0.50	1.50	220.80	12.31
	0.50	-0.50	225.80	14.44
	1.50	2.50	235.80	6.08
	1.50	0.50	240.80	7.00
	1.50	2.50	316.80	14.67

			1.50	0.50	321.80	17.13
			2.50	3.50	331.80	9.90
			2.50	1.50	336.80	10.03
			2.50	3.50	409.70	15.97
			2.50	1.50	414.70	18.83
			3.50	4.50	424.70	12.79
			3.50	2.50	429.70	12.60
			3.50	2.50	-201.90	-7.06
			-3.50	-4.50	-201.90	-12.03
			-2.50	-1.50	-181.90	-12.34
			-2.50	-3.50	-181.90	-13.61
			-2.50	-1.50	-76.00	-1.95
			-2.50	-3.50	-76.00	-6.40
			-1.50	-0.50	-56.00	-8.03
			-1.50	-2.50	-56.00	-10.22
			-1.50	-0.50	44.00	0.03
			-1.50	-2.50	44.00	-4.04
			-0.50	0.50	64.00	-6.26
			-0.50	-1.50	64.00	-9.31
			-0.50	-0.50	166.90	7.58
			-0.50	-1.50	166.90	3.85
			0.50	1.50	186.90	1.67
			0.50	-0.50	186.90	-2.23
			0.50	1.50	286.80	14.80
			0.50	-0.50	286.80	11.39
			1.50	2.50	306.80	9.89
			1.50	0.50	306.80	5.11
			1.50	2.50	400.70	18.77
			1.50	0.50	400.70	15.71
			2.50	3.50	420.70	15.54
			2.50	1.50	420.70	9.81
			2.50	3.50	499.60	10.74
			2.50	1.50	499.60	8.10
			3.50	4.50	519.60	9.34
			3.50	2.50	519.60	3.19
^{172}YbF	$^{\circ}P_{12}(2), \perp$	756.8	1.50	2.50	121.90	-23.09
			0.50	-0.50	42.00	-28.53
			-0.50	0.50	191.90	-6.91
			-1.50	-0.50	112.40	7.50
			-0.50	0.50	-69.00	-19.76
			1.50	2.50	-140.90	-35.26
			-0.50	-1.50	-170.90	-14.06
			0.50	-0.50	-221.90	-8.37
			1.50	2.50	137.90	-7.75
			0.50	-0.50	72.00	1.10
		123.7	-0.50	0.50	197.90	-1.64
			-1.50	-0.50	137.90	32.58
			-0.50	0.50	-69.00	-19.40
			1.50	2.50	-143.90	-37.85
			-0.50	-1.50	-173.90	-16.39

^{174}YbF	$^{\circ}P_{12}(2), \perp$	124.1	0.50	-0.50	-230.80	-16.54
			1.50	2.50	143.90	-2.41
			0.50	-0.50	80.90	9.63
			-0.50	0.50	-72.00	-22.03
		237.6	1.50	2.50	-101.90	4.57
			-0.50	-1.50	-161.90	-3.71
			0.50	-0.50	-230.80	-15.81
			1.50	2.50	368.70	25.49
		350.3	0.50	-0.50	197.00	14.76
			0.50	-0.50	-155.60	19.19
			1.50	2.50	-224.80	32.58
			-1.50	-2.50	-334.30	-19.40
		467.6	0.50	-0.50	-446.60	-37.85
			1.50	2.50	530.60	-14.93
			0.50	1.50	617.60	3.54
			-0.50	0.50	287.80	-11.35
			-1.50	-0.50	366.60	22.44
			-0.50	0.50	-269.80	20.90
			1.50	2.50	-356.60	-12.40
			-0.50	-1.50	-545.60	13.85
			0.50	-0.50	-623.60	5.37
			1.50	2.50	728.50	-29.59
			0.50	1.50	821.40	-7.30
			-1.50	-0.50	473.70	5.70
			0.50	-0.50	386.70	-34.71
			0.50	-0.50	-416.70	-3.69
			1.50	2.50	-485.70	17.40
			-1.50	-2.50	-761.50	10.91
			0.50	-0.50	-842.40	1.36
			0.50	-0.50	419.70	-1.71
			0.50	-0.50	-389.70	23.32
			1.50	2.50	-458.70	9.60
			0.50	-0.50	-380.60	32.31
			1.50	2.50	-461.70	6.60
			-1.50	-2.50	-743.50	28.31
		123.3	1.50	2.50	119.90	-25.10
			0.50	-0.50	39.00	-31.52
			0.50	1.50	197.90	-0.94
			-1.50	-0.50	119.90	14.98
			0.50	-0.50	-72.00	-9.29
			1.50	2.50	-134.90	-29.25
			-1.50	-2.50	-170.90	-14.06
			0.50	-0.50	-230.80	-17.28
		123.7	1.50	2.50	158.90	13.24
			0.50	-0.50	83.00	13.01
			0.50	1.50	236.80	37.23
			0.50	-0.50	-57.00	6.07
			-0.50	-2.50	-164.90	-7.39
			1.50	2.50	-107.90	-1.83
			0.50	-0.50	-215.70	-1.55

124.1	1.50	2.50	146.90	0.58
	0.50	-0.50	69.00	-2.27
	0.50	1.50	221.80	21.50
	-1.50	-0.50	134.90	29.14
	0.50	-0.50	-66.00	-2.56
	-1.50	-2.50	-167.90	-9.72
	1.50	2.50	-137.90	-31.41
	0.50	-0.50	-227.80	-12.81
237.6	1.50	2.50	347.80	4.57
	0.50	1.50	421.20	13.32
	0.50	-0.50	200.90	17.77
	1.50	2.50	-215.80	8.76
	-1.50	-2.50	-356.80	-0.13
	0.50	-0.50	-407.60	14.94
350.3	1.50	2.50	530.60	-14.93
	0.50	1.50	617.60	3.54
	0.50	-0.50	281.80	-11.35
	-1.50	-0.50	371.70	22.44
	0.50	-0.50	-266.80	20.90
	1.50	2.50	-353.60	-12.40
	-1.50	-2.50	-540.60	13.85
	0.50	-0.50	-614.60	5.37
467.6	0.50	1.50	824.40	-4.33
	-1.50	-0.50	467.70	-0.32
	0.50	-0.50	-389.70	23.32
	1.50	2.50	-476.70	-8.38
	-1.50	-2.50	-770.50	1.81
	1.50	2.50	755.70	-2.61
	0.50	1.50	851.40	22.67
	0.50	-0.50	413.70	-7.71
	0.50	-0.50	752.50	-5.61
	0.50	-0.50	854.40	25.67
	1.50	2.50	410.70	-10.71
	0.50	-0.50	491.60	23.58

Std. dev. of fit =12.6 MHz
