HIGH RESOLUTION STUDY OF THE $\tilde{B}^2\Sigma^+ - \tilde{X}^2\Sigma^+$, $\tilde{A}^2\Pi - \tilde{X}^2\Sigma^+$, AND $\tilde{A}'^2\Pi_{3/2} - \tilde{X}^2\Sigma^+$ SYSTEMS OF YTTRIUM IMIDE (Y^{14} NH, Y^{15}NH, AND Y^{14}ND).

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Results of high resolution molecular beam studies of the $\tilde{B}^2\Sigma^+ - \tilde{X}^2\Sigma^+$, $\tilde{A}^2\Pi - \tilde{X}^2\Sigma^+$, and $\tilde{A}'^2\Pi_{3/2} - \tilde{X}^2\Sigma^+$ (0,0,0 − 0,0,0) transitions in yttrium imide are reported. Preliminary analysis of several transitions between Renner-Teller vibronic states is also presented. Three isotopomers (Y^{14}NH, Y^{15}NH, and Y^{14}ND) are investigated. The YNH molecules are produced by laser ablation of yttrium metal in the presence of ammonia diluted in helium gas (1-2%). Molecules are excited by a ring dye laser and laser induced fluorescence is detected. The spectra are very complicated due to multiple perturbations in the upper states and nuclear magnetic hyperfine structure in the ground state. The hyperfine structure arrises from the interaction of the unpaired σ electron with the ^{89}Y nucleus. Some of the perturbers are assigned to vibronic states originating from low-energy electronic states and others are treated as effective perturbers. The spectra are deperturbed and accurate molecular constants for the zero-vibration levels of the $\tilde{B}^2\Sigma^+$, $\tilde{A}^2\Pi$, $\tilde{A}'^2\Pi_{3/2}$, and $\tilde{X}^2\Sigma^+$ electronic states as well as some of the perturbers are obtained. The yttrium imide is found to have the linear Y-N-H structure in the four electronic states studied in this project. The bond lengths (r_0) are determined to be:

	r_{YN} [nm]		r_{NH} [nm]	
$\tilde{X}^2\Sigma^+$	0.187785	(17)	0.10039	(14)
$\tilde{A}^2\Pi$	0.1894	(10)	0.1112	(95)
$\tilde{B}^2\Sigma^+$	0.18848	(52)	0.1236	(46)

The results are discussed and related to isovalent diatomic and triatomic molecules (YO, ScNH).