1035-14-1054 **Jerome William Hoffman*** (hoffman@math.lsu.edu), Department of Mathematics, LSU, Baton Rouge, LA 70803. *Zeta functions of buildings and Shimura varieties.* Preliminary report.

Let $\Gamma \subset \mathrm{SL}_2(\mathbb{Q}_p)$ be a discrete cocompact subgroup. Ihara introduced a zeta function $\zeta_\Gamma(s)$ in analogy with the Selberg zeta for a discrete cocompact $\Gamma \subset \mathrm{SL}_2(\mathbb{R})$. Ihara's zeta has an Euler product, and remarkably is a rational function. Later this zeta was constructed in a purely combinatorial way in terms of the finite graph $X_\Gamma = \Gamma\backslash X$ where X is the Bruhat-Tits building (tree) for $\mathrm{SL}_2(\mathbb{Q}_p)$. All this was later generalized to define the zeta (and L) functions of any graph. Ihara's deepest discovery in this area is that often $\zeta_\Gamma(s)$ is essentially equal to the zeta function $Z(Y/\mathbb{F}_p, s)$ for a Shimura curve Y. If Y is any Shimura variety, we raise the general question as to whether $Z(Y/\mathbb{F}_p, s)$ may be similarly expressed in terms of combinatorial zeta functions of complexes such as $\Gamma\backslash X$ where X is the Bruhat-Tits building for suitable reductive groups G over local fields. We discuss recent proposals to define zeta functions of discrete cocompact $\Gamma \subset G(\mathbb{Q}_p)$. (Received September 18, 2007)