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## Chapter 1 : Automorphic form - Wikipedia

*Spectral Methods of Automorphic Forms Second Edition Henryk Iwaniec Graduate Studies in Mathematics Volume 53 American Mathematical Society Providence, Rhode Island.*

The Casimir operator condition says that some Laplacians [ citation needed ] have F as eigenfunction; this ensures that F has excellent analytic properties, but whether it is actually a complex-analytic function depends on the particular case. The values of j may be complex numbers, or in fact complex square matrices, corresponding to the possibility of vector-valued automorphic forms. The cocycle condition imposed on the factor of automorphy is something that can be routinely checked, when j is derived from a Jacobian matrix , by means of the chain rule. History[ edit ] Before this very general setting was proposed around , there had already been substantial developments of automorphic forms other than modular forms. The Hilbert modular forms also called Hilbert-Blumenthal forms were proposed not long after that, though a full theory was long in coming. The Siegel modular forms , for which G is a symplectic group , arose naturally from considering moduli spaces and theta functions. The post-war interest in several complex variables made it natural to pursue the idea of automorphic form in the cases where the forms are indeed complex-analytic. Much work was done, in particular by Ilya Piatetski-Shapiro , in the years around , in creating such a theory. The theory of the Selberg trace formula , as applied by others, showed the considerable depth of the theory. Robert Langlands showed how in generality, many particular cases being known the Riemann-Roch theorem could be applied to the calculation of dimensions of automorphic forms; this is a kind of post hoc check on the validity of the notion. From the point of view of number theory, the cusp forms had been recognised, since Srinivasa Ramanujan , as the heart of the matter. Automorphic representations[ edit ] The subsequent notion of an "automorphic representation" has proved of great technical value when dealing with G an algebraic group , treated as an adelic algebraic group. It does not completely include the automorphic form idea introduced above, in that the adelic approach is a way of dealing with the whole family of congruence subgroups at once. Inside an L2 space for a quotient of the adelic form of G, an automorphic representation is a representation that is an infinite tensor product of representations of p-adic groups , with specific enveloping algebra representations for the infinite prime s. One way to express the shift in emphasis is that the Hecke operators are here in effect put on the same level as the Casimir operators; which is natural from the point of view of functional analysis [ citation needed ], though not so obviously for the number theory. It is this concept that is basic to the formulation of the Langlands philosophy. He named them Fuchsian functions, after the mathematician Lazarus Fuchs , because Fuchs was known for being a good teacher and had researched on differential equations and the theory of functions. Automorphic functions then generalize both trigonometric and elliptic functions. For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series ; I had only to write out the results, which took but a few hours.

## Chapter 2 : Talks | Min Lee

*Automorphic forms are one of the central topics of analytic number theory. In fact, they sit at the confluence of analysis, algebra, geometry, and number theory.*

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## Chapter 7 : CiteSeerX â€” Citation Query Spectral methods of automorphic forms. Second edition

*Some familiarity with analytic number theory, automorphic forms and spectral methods is assumed. The reader should also feel confortable with elementary number theory.*

## Chapter 8 : Henryk Iwaniec (Author of Spectral Methods of Automorphic Forms)

*Abstract. These are the notes to accompany some lectures delivered at the NATO ASI summer school in MontrÃ©al. They constitute an introduction to the spectral theory of automorphic forms.*

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