# Families of Siegel modular forms, *L*-functions and modularity lifting conjectures

- **Authors**
- **Authors and affiliations**

- Alexei Panchishkin

  - Alexei Panchishkin
    - 1

  1. 1.Institut Fourier - UMR 5582Universite Grenoble 1Saint-Martin d'HeresFrance

## Abstract

For a prime $p$ and a positive integer $g$, by making use of certain lifting procedures, we study some constructions of $p$-adic families of Siegel modular forms of genus $g$ and associated $p$-adic $L$-functions. Describing $L$-functions attached to Siegel modular forms and their analytic properties from the point of view of motivic $L$-functions studied by Deligne and Yoshida, we discuss critical values of the $L$-functions and $p$-adic interpolation problems. In particular, we formulate a general conjecture on the existence of the modularity lifting from $\mathrm{GSp}_r \times \mathrm{GSp}_{2m}$ to $\mathrm{GSp}_{r+2m}$ for some positive integers $r$ and $m$.

## References

1. [Aga08]

M. Agarwal, *p-adic L-functions for GSp*(4) × *GL*(2), Dissertation, University of Michigan, 2007.

2. [An74]
A. N. Andrianov, *Euler products corresponding to Siegel modular forms of genus 2*, Russian Mathematical Surveys **29** (1974), 45–116 (Uspekhi Mat. Nauk **29** (1974), no. 3, 43–110).MathSciNet (http://www.ams.org/mathscinet-getitem?mr=432552)MATH (http://www.emis.de/MATH-item?0304.10021)CrossRef (http://dx.doi.org/10.1070/RM1974v029n03ABEH001285)Google Scholar (http://scholar.google.com/scholar_lookup?title=Euler%20products%20corresponding%20to%20Siegel%20modular%20forms%20of%20genus%202&author=A.%20N..%20Andrianov&journal=Russian%20Mathematical%20Surveys&volume=29&pages=45-116&publication_year=1974)

3. [An87]
A. N. Andrianov, *Quadratic Forms and Hecke Operators*, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, 1987.MATH (http://www.emis.de/MATH-item?0613.10023)Google Scholar (http://scholar.google.com/scholar_lookup?title=Quadratic%20Forms%20and%20Hecke%20Operators&author=A.%20N..%20Andrianov&publication_year=1987)

4. [An-Ka]
A. N. Andrianov and V. L. Kalinin, *On analytic properties of standard zeta functions of siegel modular forms*, Matematicheskiĭ Sbornik **106** (1978), 323–339.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=506044)Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20analytic%20properties%20of%20standard%20zeta%20functions%20of%20siegel%20modular%20forms&author=A.%20N..%20Andrianov&author=V.%20L..%20Kalinin&journal=Matematicheski%C4%AD%20Sbornik&volume=106&pages=323-339&publication_year=1978)

5. [AsgSch2000]
M. Asgari and R. Schmidt, *Siegel modular forms and representations*, Manuscripta Mathematica **104** (2001), 173–200.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1821182)MATH (http://www.emis.de/MATH-item?0987.11037)CrossRef (http://dx.doi.org/10.1007/PL00005869)Google Scholar (http://scholar.google.com/scholar_lookup?title=Siegel%20modular%20forms%20and%20representations&author=M..%20Asgari&author=R..%20Schmidt&journal=Manuscripta%20Mathematica&volume=104&pages=173-200&publication_year=2001)

6. [Bö85]
S. Böcherer, *Über die Funktionalgleichung Automorpher L-Funktionnen zur Siegelschen Modulgruppe*, Journal für die Reine und Angewandte Mathematik **362** (1985), 146–168.MATH (http://www.emis.de/MATH-item?0565.10025)CrossRef (http://dx.doi.org/10.1515/crll.1985.362.146)Google Scholar (http://scholar.google.com/scholar_lookup?title=%C3%9Cber%20die%20Funktionalgleichung%20Automorpher%20L-Funktionnen%20zur%20Siegelschen%20Modulgruppe&author=S..%20B%C3%B6cherer&journal=Journal%20f%C3%BCr%20die%20Reine%20und%20Angewandte%20Mathematik&volume=362&pages=146-168&publication_year=1985)

7. [BH06]
S. Böcherer and B. Heim, *Critical values of L-functions on GSp $_2$ × GL $_2$*, Mathematische Zeitschrift **254** (2006), 485–503.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=2244361)MATH (http://www.emis.de/MATH-item?1197.11059)CrossRef (http://dx.doi.org/10.1007/s00209-005-0945-z)Google Scholar (http://scholar.google.com/scholar_lookup?title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20Critical%20values%20of%20L-functions%20on%20GSp%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%202%20%C3%97%20GL%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%202%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20&author=S..%20B%C3%B6cherer&author=B..%20Heim&journal=Mathematische%20Zeitschrift&volume=254&pages=485-503&publication_year=2006)

8. [Boe-Pa6]
S. Böcherer and A. A. Panchishkin, *Admissible p-adic measures attached to triple products of elliptic cusp forms*, Documenta Mathematica, Extra Volume: John H. Coates' Sixtieth Birthday (2006), 77–132.

9. [Boe-Pa9]
S. Böcherer and A. A. Panchishkin, *p-adic interpolation of triple L-functions: Analytic aspects*, in *Automorphic Forms and L-functions II: Local Aspects* (D. Ginzburg, E. Lapid and D. Soudry, eds.), American Mathematical Society, Bar Ilan University, 2009, pp. 1–41

10. [Boe-Sch]

S. Böcherer and C.-G. Schmidt, *p-adic measures attached to Siegel modular forms*, Université de Grenoble. Annales de l'Institut Fourier **50** (2000), 1375–1443.MATH (http://www.emis.de/MATH-item?0962.11023)CrossRef (http://dx.doi.org/10.5802/aif.1796)Google Scholar (http://scholar.google.com/scholar_lookup?title=p-adic%20measures%20attached%20to%20Siegel%20modular%20forms&author=S..%20B%C3%B6cherer&author=C.-G..%20Schmidt&journal=Universit%C3%A9%20de%20Grenoble.%20Annales%20de%20l%E2%80%99Institut%20Fourier&volume=50&pages=1375-1443&publication_year=2000)

11. [ChVa08]

F. Chiera and K. Vankov, *On special values of spinor L-functons of Siegel cusp eigenforms of genus 3*, arXiv:0805.2114 [math.NT], 2008. http://arxiv.org/abs/0805.2114 (http://arxiv.org/abs/0805.2114).

12. [Co]

J. Coates, *On p-adic L-functions*, Séminaire Bourbaki, 40éme année, 1987–88, Asterisque **701** (1989), 177–178.Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20p-adic%20L-functions&author=J..%20Coates&journal=S%C3%A9minaire%20Bourbaki%2C%2040%0C%C3%A9me%20ann%C3%A9e%2C%201987%E2%80%9388%2C%20Asterisque&volume=701&pages=177-178&publication_year=1989)

13. [Co-PeRi]

J. Coates, and B. Perrin-Riou, *On p-adic L-functions attached to motives over* ℚ, Advanced Studies in Pure Mathematics **17** (1989), 23–54.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1097608)Google Scholar (http://scholar.google.com/scholar_lookup?title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20On%20p-adic%20L-functions%20attached%20to%20motives%20over%20%E2%84%9A&author=J..%20Coates&author=B..%20Perrin-Riou&journal=Advanced%20Studies%20in%20Pure%20Mathematics&volume=17&pages=23-54&publication_year=1989)

14. [CoPB]

R. Coleman, *p-adic Banach spaces and families of modular forms*, Inventiones Mathematicae **127** (1997), 417–479.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1431135)MATH (http://www.emis.de/MATH-item?0918.11026)CrossRef (http://dx.doi.org/10.1007/s002220050127)Google Scholar (http://scholar.google.com/scholar_lookup?title=p-adic%20Banach%20spaces%20and%20families%20of%20modular%20forms&author=R..%20Coleman&journal=Inventiones%20Mathematicae&volume=127&pages=417-479&publication_year=1997)

15. [CST98]

R. Coleman, G. Stevens and J. Teitelbaum, *Numerical experiments on families of p-adic modular forms*, in *Computational perspectives in Number Theory* (D. A. Buell and J. T. Teitelbaum eds.), American Mathematical Society, Providence, RI, 1998, pp. 143–158.Google Scholar (http://scholar.google.com/scholar_lookup?title=Numerical%20experiments%20on%20families%20of%20p-adic%20modular%20forms&author=R..%20Coleman&author=G..%20Stevens&author=J..%20Teitelbaum&pages=143-158&publication_year=1998)

16. [Colm03]

P. Colmez, *La conjecture de Birch et Swinnerton-Dyer p-adique*, Séminaire Bourbaki, exposé nᵒ 919, juin 2003.

17. [CourPa]

M. Courtieu and A. A. Panchishkin, *Non-Archimedean L-Functions and Arithmetical Siegel Modular Forms*, Lecture Notes in Mathematics **1471** (2nd augmented edn.), Springer-Verlag, Berlin, 2004.MATH (http://www.emis.de/MATH-item?1070.11023)Google Scholar (http://scholar.google.com/scholar_lookup?title=Non-Archimedean%20L-Functions%20and%20Arithmetical%20Siegel%20Modular%20Forms&author=M..%20Courtieu&author=A.%20A..%20Panchishkin&publication_year=2004)

18. [De79]

P. Deligne, *Valeurs de fonctions L et périodes d'intégrales*, in *Proceedings of Symposia in Pure Mathematics*, Vol. 55, American Mathematical Society, Providence, RI, 1979, pp. 313–346.Google Scholar (http://scholar.google.com/scholar_lookup?title=Valeurs%20de%20fonctions%20L%20et%20p%C3%A9riodes%20d%E2%80%99int%C3%A9grales&author=P..%20Deligne&publication_year=1979)

19. [Deu]

M. Deuring, *Die Zetafunktion einer algebraischen Kurve vom Geschlecht eins I–IV*, Nachrichten der Akademie der Wissenschaften in Göttingen (1953), 85–94; (1955), 13–42; (1956), 37–76; (1957), 55–80.

20. [DI98]

W. Duke and Ö. Imamoglu, *Siegel modular forms of small weight*, Mathematische Annalen **310** (1998), 73–82.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1600030)MATH (http://www.emis.de/MATH-item?0892.11017)CrossRef (http://dx.doi.org/10.1007/s002080050137)Google Scholar

(http://scholar.google.com/scholar_lookup?
title=Siegel%20modular%20forms%20of%20small%20weight&author=W..%20Duke
&author=.%20Imamoglu&journal=Mathematische%20Annalen&volume=310&pages
=73-82&publication_year=1998)

21. [Fe]
P. Feit, *Poles and Residues of Eisenstein Series for Symplectic and Unitary Groups*,
Memoires of the American Mathematical Society **61** (1986), No. 346, 89 pp.

22. [Ha81]
M. Harris, *The rationality of holomorphic Eisenstein series*, Inventiones
Mathematicae **63** (1981), 305–310.MathSciNet (http://www.ams.org/mathscinet-
getitem?mr=610541)MATH (http://www.emis.de/MATH-item?
0452.10031)CrossRef (http://dx.doi.org/10.1007/BF01393880)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=The%20rationality%20of%20holomorphic%20Eisenstein%20series&author=M..
%20Harris&journal=Inventiones%20Mathematicae&volume=63&pages=305-
310&publication_year=1981)

23. [Ha-Li-Sk]
M. Harris, Jian-Shu Li and Ch. M. Skinner, *p-adic L-functions for unitary Shimura
varieties*, Documenta Mathematica, Extra Volume: John H.Coates' Sixtieth Birthday
(2006), 393–464.

24. [Hecke]
E. Hecke, *Über Modulfunktionen und die Dirichletschen Reihen mit Eulerscher
Produktenwickelung, I, II*, Mathematische Annalen **114** (1937), 1–28, 316–351
(Mathematische Werke, Vandenhoeck und Ruprecht, Göttingen, 1959, pp. 644–
707).MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1513122)MATH
(http://www.emis.de/MATH-item?0015.40202)CrossRef
(http://dx.doi.org/10.1007/BF01594160)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=%C3%9Cber%20Modulfunktionen%20und%20die%20Dirichletschen%20Reihe
n%20mit%20Eulerscher%20Produktenwickelung%2C%20I%2C%20II&author=E..%
20Hecke&journal=Mathematische%20Annalen&volume=114&pages=1-
28&publication_year=1937)

25. [Heim07]
B. Heim, *Miyawaki's F12 spinor L-function conjecture*. arXiv:0712.1286v1 [math.NT]
8.12.2007 (submitted).

26. [Heim08]
B. Heim, *Towards functoriality of spinor L-functions*, Manuscript, 18 pp., MPIM,
17.07.2008.

27. [Hi93]
H. Hida, *Elementary Theory of L-functions and Eisenstein Series*, London
Mathematical Society Student Texts, 26, Cambridge University Press, 2008.
arXiv:0808.3389v1 [math.NT].

28. [Ike01]
T. Ikeda, *On the lifting of elliptic cusp forms to Siegel cusp forms of degree* 2n,
Annals of Mathematics (2) **154** (2001), 641–681.MATH
(http://www.emis.de/MATH-item?0998.11023)CrossRef
(http://dx.doi.org/10.2307/3062143)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%20%20%20%20%20%20%20%20%20%20On%20the%20lifting%20
of%20elliptic%20cusp%20forms%20to%20Siegel%20cusp%20forms%20of%20degre
e%202n%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20&author=T..%20Ikeda&journal=An
nals%20of%20Mathematics%20%282%29&volume=154&pages=641-
681&publication_year=2001)

29. [Ike06]
T. Ikeda, *Pullback of the lifting of elliptic cusp forms and Miyawaki's Conjecture*,
Duke Mathematical Journal **131** (2006), 469–497.MathSciNet
(http://www.ams.org/mathscinet-getitem?mr=2219248)MATH
(http://www.emis.de/MATH-item?1112.11022)CrossRef
(http://dx.doi.org/10.1215/S0012-7094-06-13133-2)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=Pullback%20of%20the%20lifting%20of%20elliptic%20cusp%20forms%20and%
20Miyawaki%E2%80%99s%20Conjecture&author=T..%20Ikeda&journal=Duke%20
Mathematical%20Journal&volume=131&pages=469-497&publication_year=2006)

30. [Katz]
N. M. Katz, *p-Adic L-Functions for CM-Fields*, Inventiones Mathematicae **48** (1978),
199–297.CrossRef (http://dx.doi.org/10.1007/BF01390187)Google Scholar
(http://scholar.google.com/scholar_lookup?title=p-Adic%20L-
Functions%20for%20CM-
Fields&author=N.%20M..%20Katz&journal=Inventiones%20Mathematicae&volume=
48&pages=199-297&publication_year=1978)

31. [Kawa]
Hisa-aki Kawamura, Private communication (Hokkaido University (Sapporo, Japan)/
Institute Fourier (Grenoble, France)), July 2008.

32. [Ma-Vi]
Yu. I. Manin and M. M. Vishik, *p-adic Hecke series of imaginary quadratic fields*, (Russian), Matematicheskiĭ Sbornik (Novaya Seriya) **95**(137) (1974), 357–383.Google Scholar (http://scholar.google.com/scholar_lookup?title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20p-adic%20Hecke%20series%20of%20imaginary%20quadratic%20fields%2C%20%28Russian%29&author=Yu.%20I..%20Manin&author=M.%20M..%20Vishik&journal=Matematicheski%C4%AD%20Sbornik%20%28Novaya%20Seriya%29&volume=95&issue=137&pages=357-383&publication_year=1974)

33. [MTT]
B. Mazur, J. Tate and J. Teitelbaum, *On p-adic analogues of the conjectures of Birch and Swinnerton-Dyer*, Inventiones Mathematicae **84** (1986), 1–48.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=830037)MATH (http://www.emis.de/MATH-item?0699.14028)CrossRef (http://dx.doi.org/10.1007/BF01388731)Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20p-adic%20analogues%20of%20the%20conjectures%20of%20Birch%20and%20Swinnerton-Dyer&author=B..%20Mazur&author=J..%20Tate&author=J..%20Teitelbaum&journal=Inventiones%20Mathematicae&volume=84&pages=1-48&publication_year=1986)

34. [Mi92]
I. Miyawaki, *Numerical examples of Siegel cusp forms of degree 3 and their zeta-functions*, Memoirs of the Faculty of Science, Kyushu University, Ser. A **46** (1992), 307–339.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1195472)MATH (http://www.emis.de/MATH-item?0780.11022)CrossRef (http://dx.doi.org/10.2206/kyushumfs.46.307)Google Scholar (http://scholar.google.com/scholar_lookup?title=Numerical%20examples%20of%20Siegel%20cusp%20forms%20of%20degree%203%20and%20their%20zeta-functions&author=I..%20Miyawaki&journal=Memoirs%20of%20the%20Faculty%20of%20Science%2C%20Kyushu%20University%2C%20Ser.%20A&volume=46&pages=307-339&publication_year=1992)

35. [Mur02]
K. Murokawa, *Relations between symmetric power L-functions and spinor L-functions attached to Ikeda lifts*, Kodai Mathematical Journal **25** (2002), 61–71.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1891799)CrossRef (http://dx.doi.org/10.2996/kmj/1106171076)Google Scholar (http://scholar.google.com/scholar_lookup?title=Relations%20between%20symmetric%20power%20L-functions%20and%20spinor%20L-functions%20attached%20to%20Ikeda%20lifts&author=K..%20Murokawa&journal=Kodai%20Mathematical%20Journal&volume=25&pages=61-71&publication_year=2002)

36. [Nag1]
S. Nagaoka, *A remark on Serre's example of p-adic Eisenstein series*, Mathematische Zeitschrift **235** (2000), 227–250.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1795506)MATH (http://www.emis.de/MATH-item?0982.11021)CrossRef (http://dx.doi.org/10.1007/s002090000134)Google Scholar (http://scholar.google.com/scholar_lookup?title=A%20remark%20on%20Serre%E2%80%99s%20example%20of%20p-adic%20Eisenstein%20series&author=S..%20Nagaoka&journal=Mathematische%20Zeitschrift&volume=235&pages=227-250&publication_year=2000)

37. [Nag2]
S. Nagaoka, *Note on* mod *p Siegel modular forms*, Mathematische Zeitschrift **235** (2000), 405–420.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1795515)MATH (http://www.emis.de/MATH-item?0982.11022)CrossRef (http://dx.doi.org/10.1007/s002090000135)Google Scholar (http://scholar.google.com/scholar_lookup?title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20Note%20on%20mod%20p%20Siegel%20modular%20forms%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20&author=S..%20Nagaoka&journal=Mathematische%20Zeitschrift&volume=235&pages=405-420&publication_year=2000)

38. [Pa88]
A. Panchishkin, *Non-Archimedean Automorphic Zeta Functions*, Moscow University Press, 1988, 165 pp. (in Russian).

39. [Pa94]
A. Panchishkin, *Admissible non-Archimedean standard zeta functions of Siegel modular forms*, in *Proceedings of the Joint AMS Summer Conference on Motives*, Seattle, July 20–August 2 1991, Vol. 2, American Mathematical Society, Providence, RI, 1994, pp. 251–292.Google Scholar (http://scholar.google.com/scholar_lookup?title=Admissible%20non-

Archimedean%20standard%20zeta%20functions%20of%20Siegel%20modular%20fo
rms&author=A..%20Panchishkin&pages=251-292&publication_year=1994)

40. [PaAIF]
A. Panchishkin, *Motives over totally real fields and p-adic L-functions*, Université de Grenoble. Annales de l'Institut Fourier **44** (1994), 989–1023.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1306547)MATH (http://www.emis.de/MATH-item?0808.11034)CrossRef (http://dx.doi.org/10.5802/aif.1424)Google Scholar (http://scholar.google.com/scholar_lookup? title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2 0%20%20%20%20%20%20%20%20%20%20%20%20%20Motives%20over%20totall y%20real%20fields%20and%20p-adic%20L- functions%2C%20Universit%C3%A9%20de%20Grenoble&author=A..%20Panchishki n&journal=Annales%20de%20l%E2%80%99Institut%20Fourier&volume=44&pages =989-1023&publication_year=1994)

41. [PaSE]
A. A. Panchishkin, *On the Siegel-Eisenstein measure and its applications*, Israel Journal of Mathemetics **120**,Part B (2000), 467–509.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1809631)MATH (http://www.emis.de/MATH-item?0977.11021)CrossRef (http://dx.doi.org/10.1007/BF02834848)Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20the%20Siegel- Eisenstein%20measure%20and%20its%20applications&author=A.%20A..%20Panchi shkin&journal=Israel%20Journal%20of%20Mathemetics&volume=120&issue=PartB &pages=467-509&publication_year=2000)

42. [PaMMJ]
A. A. Panchishkin, *A new method of constructing p-adic L-functions associated with modular forms*, Moscow Mathematical Journal **2** (2002), Number 2, 1–16.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1944509)Google Scholar (http://scholar.google.com/scholar_lookup? title=A%20new%20method%20of%20constructing%20p-adic%20L- functions%20associated%20with%20modular%20forms&author=A.%20A..%20Panch ishkin&journal=Moscow%20Mathematical%20Journal&volume=2&issue=2&pages=1 -16&publication_year=2002)

43. [PaTV]
A. A. Panchishkin, *Two variable p-adic L functions attached to eigenfamilies of positive slope*, Inventiones Mathematicae **154** (2003), 551–615.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=2018785)MATH (http://www.emis.de/MATH-item?1065.11025)CrossRef (http://dx.doi.org/10.1007/s00222-003-0309-4)Google Scholar (http://scholar.google.com/scholar_lookup?title=Two%20variable%20p- adic%20L%20functions%20attached%20to%20eigenfamilies%20of%20positive%20sl ope&author=A.%20A..%20Panchishkin&journal=Inventiones%20Mathematicae&volu me=154&pages=551-615&publication_year=2003)

44. [Pa06]
A. A. Panchishkin, *p-adic Banach modules of arithmetical modular forms and triple products of Coleman's families*, for a special volume of Quarterly Journal of Pure and Applied Mathematics dedicated to Jean-Pierre Serre, 2006.

45. [PaVa]
A. Panchishkin and K. Vankov, *Explicit formulas for Hecke operators and Rankin's lemma in higher genus*, in *Algebra, Arithmetic and Geometry in honor of Y.I. Manin*, Progress in Mathematics, Vol. 269–270, Birkhäuser, Boston, 2010, pp. 532–554.Google Scholar (http://scholar.google.com/scholar_lookup? title=Explicit%20formulas%20for%20Hecke%20operators%20and%20Rankin%E2% 80%99s%20lemma%20in%20higher%20genus&author=A..%20Panchishkin&author =K..%20Vankov&pages=532-554&publication_year=2010)

46. [PoYu]
C. Poor and D. S. Yuen, *Computations of spaces of Siegel modular cusp forms*, Journal of the Mathematical Society of Japan **59** (2007), 185–222.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=2302669)MATH (http://www.emis.de/MATH-item?1114.11045)CrossRef (http://dx.doi.org/10.2969/jmsj/1180135507)Google Scholar (http://scholar.google.com/scholar_lookup? title=Computations%20of%20spaces%20of%20Siegel%20modular%20cusp%20forms &author=C..%20Poor&author=D.%20S..%20Yuen&journal=Journal%20of%20the%2 0Mathematical%20Society%20of%20Japan&volume=59&pages=185- 222&publication_year=2007)

47. [Ran39]
R. A. Rankin, *Contribution to the theory of Ramanujan's function $\tau(n)$ and similar arithmetical functions. I.II*, Mathematical Proceedings of the Cambridge Philosophical Society **35** (1939), 351–372.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=411)MATH (http://www.emis.de/MATH-item?0021.39201)CrossRef (http://dx.doi.org/10.1017/S0305004100021095)Google Scholar (http://scholar.google.com/scholar_lookup?

title=%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20Contribution%20to%20the%20theory%20of%20Ramanujan%E2%80%99s%20function%20%CF%84%28n%29%20and%20similar%20arithmetical%20functions.%20I.II%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20&author=R.%20A..%20Rankin&journal=Mathematical%20Proceedings%20of%20the%20Cambridge%20Philosophical%20Society&volume=35&pages=351-372&publication_year=1939)

48. [Se73]
J.-P. Serre, *Formes modulaires et fonctions zêta p-adiques*, in *Modular Functions of One Variable, III* (Proc. Internat. Summer School, Univ. Antwerp, 1972), Lecture Notes in Mathematics, Vol. 350, Springer, Berlin, 1973, pp. 191–268.CrossRef (http://dx.doi.org/10.1007/978-3-540-37802-0_4)Google Scholar (http://scholar.google.com/scholar_lookup?title=Formes%20modulaires%20et%20fonctions%20z%C3%AAta%20p-adiques&author=J.-P..%20Serre&pages=191-268&publication_year=1973)

49. [Sh75]
G. Shimura, *On the holomorphy of certain Dirichlet series*, Proceedings of the London Mathematical Society **31** (1975), 79–98.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=382176)MATH (http://www.emis.de/MATH-item?0311.10029)CrossRef (http://dx.doi.org/10.1112/plms/s3-31.1.79)Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20the%20holomorphy%20of%20certain%20Dirichlet%20series&author=G..%20Shimura&journal=Proceedings%20of%20the%20London%20Mathematical%20Society&volume=31&pages=79-98&publication_year=1975)

50. [Shi71]
G. Shimura, *Introduction to the Arithmetic Theory of Automorphic Functions*, Princeton University Press, 1971.

51. [Shi83]
G. Shimura, *On Eisentsein Series*, Duke Mathematical Journal **50** (1983), 417–476.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=705034)MATH (http://www.emis.de/MATH-item?0519.10019)CrossRef (http://dx.doi.org/10.1215/S0012-7094-83-05019-6)Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20Eisentsein%20Series&author=G..%20Shimura&journal=Duke%20Mathematical%20Journal&volume=50&pages=417-476&publication_year=1983)

52. [Shi95]
G. Shimura, *Eisenstein series and zeta functions on symplectic groups*, Inventiones Mathematicae **119** (1995), 539–584.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1317650)MATH (http://www.emis.de/MATH-item?0845.11020)CrossRef (http://dx.doi.org/10.1007/BF01245192)Google Scholar (http://scholar.google.com/scholar_lookup?title=Eisenstein%20series%20and%20zeta%20functions%20on%20symplectic%20groups&author=G..%20Shimura&journal=Inventiones%20Mathematicae&volume=119&pages=539-584&publication_year=1995)

53. [ShiAr]
G. Shimura, *Arithmeticity in the Theory of Automorphic Forms*, Mathematical Surveys and Monographs, Vol. 82, American Mathematical Society, Providence, RI, 2000.MATH (http://www.emis.de/MATH-item?0967.11001)Google Scholar (http://scholar.google.com/scholar_lookup?title=Arithmeticity%20in%20the%20Theory%20of%20Automorphic%20Forms&author=G..%20Shimura&publication_year=2000)

54. [We56]
A. Weil, *On a certain type of characters of the idèle-class group of an algebraic number-field*, in *Proceedings of the International Symposium on Algebraic Number Theory, Tokyo & Nikko, 1955*, Science Council of Japan, Tokyo, 1956, pp. 1–7Google Scholar (http://scholar.google.com/scholar_lookup?title=On%20a%20certain%20type%20of%20characters%20of%20the%20id%C3%A8le-class%20group%20of%20an%20algebraic%20number-field&author=A..%20Weil&pages=1-7&publication_year=1956)

55. [Wi95]
A. Wiles, *Modular elliptic curves and Fermat's Last Theorem*, Annals of Mathematics (2) **141** (1995), 443–455.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=1333035)MATH (http://www.emis.de/MATH-item?0823.11029)CrossRef (http://dx.doi.org/10.2307/2118559)Google Scholar (http://scholar.google.com/scholar_lookup?title=Modular%20elliptic%20curves%20and%20Fermat%E2%80%99s%20Last%20Theorem&author=A..%20Wiles&journal=Annals%20of%20Mathematics%20%282%29&volume=141&pages=443-455&publication_year=1995)

56. [Yosh81]
H. Yoshida, *Siegel's modular forms and the arithmetic of quadratic forms*, Inventiones Mathematicae **60** (1980), 193–248.MathSciNet (http://www.ams.org/mathscinet-getitem?mr=586427)MATH (http://www.emis.de/MATH-item?0453.10022)CrossRef

(http://dx.doi.org/10.1007/BF01390016)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=Siegel%E2%80%99s%20modular%20forms%20and%20the%20arithmetic%20o
f%20quadratic%20forms&author=H..%20Yoshida&journal=Inventiones%20Mathem
aticae&volume=60&pages=193-248&publication_year=1980)

57. [Yosh01]
H. Yoshida, *Motives and Siegel modular forms*, American Journal of Mathematics
**123** (2001), 1171–1197.MathSciNet (http://www.ams.org/mathscinet-getitem?
mr=1867315)MATH (http://www.emis.de/MATH-item?0998.11022)CrossRef
(http://dx.doi.org/10.1353/ajm.2001.0042)Google Scholar
(http://scholar.google.com/scholar_lookup?
title=Motives%20and%20Siegel%20modular%20forms&author=H..%20Yoshida&jou
rnal=American%20Journal%20of%20Mathematics&volume=123&pages=1171-
1197&publication_year=2001)

# Copyright information

# About this article