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5. It is possible to formulate Frobenius reciprocity for unitary representations on a Hilbert space  $\mathcal{H}(D)$  of  $L_2$ -solutions of an invariant elliptic differential operator  $D$  on homogeneous bundles over a homogeneous space  $G/H$  whose isotropy subgroup  $H$  is compact modulo the center of  $G$ . Here  $G$  is a connected unimodular Lie group (not necessarily semisimple) subject to some mild structural constraints. In [33] Connes and Moscovici show that  $\mathcal{H}(D)$  decomposes as a finite direct sum of irreducible unitary representations all of which are square-integrable modulo the center of  $G$  and occur with finite multiplicity. They derive for  $\mathcal{H}(D)$  a reciprocity analogous to that expressed for the  $L_2$ -cohomology spaces in Theorem 3.15 and Theorem 4.3.

## REFERENCES

- [1] AHIEZER, D. Cohomology of compact homogeneous spaces. *Mat. Sb.* 84 (126) (1971), 290-300 = *Math. USSR Sb.* 13 (1971), 285-296.
- [2] ANDREOTTI, A. and E. VESSENTINI. Carleman estimates for the Laplace-Beltrami operator on complex manifolds. *Publ. I.H.E.S. No. 25* (1965), 313-362.
- [3] ATIYAH, M. Elliptic operators, discrete groups and von Neumann algebras. *Astérisque* 32-33 (1976), 43-72.
- [4] ——— *Characters of semisimple Lie groups*. Mimeographed lecture notes, Univ. of Oxford.
- [5] ——— The Harish-Chandra character. *Lecture No. 7 from Proceedings of the SRC/LMS Research Symposium on Representations of Lie Groups, London Math. Soc. Series 34*, Cambridge Univ. Press, 176-181.
- [6] ATIYAH, M. and W. SCHMID. A geometric construction of the discrete series for semisimple Lie groups. *Inventiones Math.* 42 (1977), 1-62.
- [7] ——— A new proof of the regularity theorem for invariant eigendistributions on semisimple Lie groups. *To appear*.
- [8] AUSLANDER, L. and B. KOSTANT. Polarization and unitary representations of solvable Lie groups. *Inventiones Math.* 14 (1971), 255-354.
- [9] BERNAT, P., N. CONZE, M. DUFLO, M. LÉVY-NAHAS, M. RAIS, P. RENOARD et M. VERGNE. *Représentations des groupes de Lie résolubles*. Monographies de la Société Mathématique de France, Dunod, éditeur. (1972) Paris.
- [10] BLATTNER, R. On induced representations. *Amer. J. of Math.* 83 (1961), 79-98.
- [11] BOREL, A. et A. WEIL. Représentations linéaires et espaces homogènes Kähleriens des groupes de Lie compacts. *Séminaire Bourbaki*, May 1954 (exposé by J.-P. Serre).
- [12] BOTT, R. Homogeneous vector bundles. *Annals of Math.* (2) 66 (1957), 203-248.
- [13] ——— Induced representations. *Seminars on Analytic Functions, Vol. 2*, Institute for Advanced Study, Princeton, N.J., 1957.
- [14] BRUHAT, F. Travaux de Harish-Chandra. *Séminaire Bourbaki*, exposé 143 (1957), 1-9.
- [15] CARMONA, J. Représentations du groupe de Heisenberg dans les espaces de  $(0, q)$ -formes. *Math. Ann.* 205 (1973), 89-112.
- [16] CARTAN, E. Les tenseurs irréductibles et les groupes simples et semisimples. *Bull. Sci. Math.* 49 (1925), 130-152.

- [17] CASSELMAN, W. and M. OSBORNE. The  $n$ -cohomology of representations with an infinitesimal character. *Compositio Math.* 31 (1975), 219-227.
- [18] HARISH-CHANDRA. On some applications of the universal enveloping algebra of a semisimple Lie algebra. *Trans. Amer. Soc.* 70 (1951), 28-96.
- [19] ——— Representations of a semisimple Lie group on a Banach Space I. *Trans. Amer. Math. Soc.* 75 (1953), 185-243.
- [20] ——— Representations of semisimple Lie groups II, III. *Trans. Amer. Math. Soc.* 76 (1954), 26-65 and 234-253, respectively.
- [21] ——— Representations of semisimple Lie groups IV, V. *Amer. J. of Math.* 77 (1955), 743-777 and 78 (1956), 1-41, respectively.
- [22] ——— Representations of semisimple Lie groups VI: Integrable and square-integrable representations. *Amer. J. of Math.* 78 (1956), 564-628.
- [23] ——— The characters of semisimple Lie groups. *Trans. Amer. Math. Soc.* 83 (1956), 98-163.
- [24] ——— Invariant eigendistributions on a semisimple Lie group. *Trans. Amer. Math. Soc.* 119 (1965), 457-508.
- [25] ——— Discrete series for semisimple Lie groups I. *Acta Math.* 113 (1965), 241-318.
- [26] ——— Discrete series for semisimple Lie groups II: Explicit determination of the characters. *Acta Math.* 116 (1966), 1-111.
- [27] ——— Two theorems on semisimple Lie groups. *Annals of Math.* (2) 83 (1966), 74-128.
- [28] ——— Harmonic analysis on semisimple Lie groups. *Bull. Amer. Math. Soc.* 76 (1970), 529-551.
- [29] CHEVALLEY, C. *Theory of Lie groups I*. Princeton Math. Series, No. 8, Princeton Univ. Press, Princeton, N.J., 1946.
- [30] CHEVALLEY, C. and S. EILENBERG. Cohomology theory of Lie groups and Lie algebras. *Trans. Amer. Soc.* 63 (1948), 85-124.
- [31] CONNES, A. and H. MOSCOVICI. The  $L_2$ -index theorem for homogeneous spaces. *Bull. Amer. Math. Soc.* 1 (1977), 688-690.
- [32] ——— The  $L_2$ -index theorem for homogeneous spaces of Lie groups. *To appear*.
- [33] ——— Invariant elliptic equations and discrete series representations. *Preprint I.H.E.S.*, March 1980.
- [34] DEMAZURE, M. Une démonstration algébrique d'un théorème de Bott. *Inventiones Math.* 5 (1968), 349-356.
- [35] DOLBEAULT, P. Formes différentielles et cohomologie sur une variété analytique complexe I. *Annals of Math.* (2) 64 (1956), 83-130.
- [36] DUFLO, M. Représentations de carré intégrable des groupes semisimple réels. *Séminaire Bourbaki*, Vol. 1977/78, exposés 507-524, Springer-Verlag Lecture Notes No. 710, 22-40.
- [37] FROBENIUS, G. Über relationen zwischen den characteren einer gruppe and ihrer untergruppen. *Sitzungsb Kön Preusz. Akad. Wiss. zu Berlin* (1898), 501-515.
- [38] ——— Über die composition der caractere einen gruppe. *Sitzungsb Kön Preusz. Akad. Wiss. zu Berlin* (1899), 330-339.
- [39] GRIFFITHS, P. Some geometric and analytic properties of homogeneous complex manifolds Part I: Sheaves and cohomology. *Acta Math.* 110 (1963), 115-155.
- [40] GRIFFITHS, P. and W. SCHMID. Locally homogeneous complex manifolds. *Acta Math.* 123 (1969), 253-302.
- [41] GUNNING, R. and H. ROSSI. *Analytic functions of several complex variables*. Prentice-Hall, Englewood Cliffs, N.J., 1967.
- [42] HELGASON, S. *Differential geometry and symmetric spaces*. Academic Press, New York and London, 1962.

- [43] HIRZEBRUCH, F. *Topological methods in algebraic geometry*. Die Grundlehren der Math. Wissenschaften, Band 131, Springer-Verlag, Berlin, Heidelberg, New York, 1966.
- [44] HOCHSCHILD, G. and J.-P. SERRE. Cohomology of Lie algebras. *Annals of Math. (2)* 57 (1953), 591-603.
- [45] HOTTA, R. On realization of the discrete series for semisimple Lie groups. *J. Math. Soc. Japan* 23 (1971), 384-407.
- [46] HUMPHREYS, J. *Introduction to Lie algebras and representation theory*. Graduate Texts in Math. Vol. 9, Springer-Verlag, Berlin, Heidelberg, New York, 1973.
- [47] ISE, M. Some properties of complex analytic vector bundles over compact complex homogeneous spaces. *Osaka Math. J.* 12 (1960), 217-252.
- [48] JACOBSON, N. *Lie algebras*. Interscience Tracts in Pure and Appl. Math. No. 10, Interscience, New York, 1962.
- [49] KIRILLOV, A. Unitary representations of nilpotent Lie groups. *Uspekhi Mat. Nauk.* 17 (1962), 57-110 — Russian Math. Surveys 17 (1962), 53-104.
- [50] KOSTANT, B. Lie algebra cohomology and the generalized Borel-Weil theorem. *Annals of Math. (2)* 74 (1961), 329-387.
- [51] ——— Orbits, symplectic structures and representation theory. *Proc. U.S.-Japan Seminar Diff. Geom.*, Kyoto, Japan, 1965.
- [52] KOSTANT, B. M.I.T. Lecture Notes (*unpublished*), 1967.
- [53] ——— On certain representations which arise from a quantization theory. *Springer-Verlag Lecture Notes in Physics* 6 (1970), 237-253, Berlin, Heidelberg, New York.
- [54] LANGLANDS, R. Dimension of spaces of automorphic forms. *Proc. of Symposia in Pure Math. IX* (1966), 253-257.
- [55] MACKEY, G. Induced representations of locally compact groups I. *Annals of Math. (2)* 55 (1952), 101-139.
- [56] ——— Induced representations of locally compact groups II. *Annals of Math. (2)* 58 (1953), 193-221.
- [57] MOORE, C. and J. WOLF. Square integrable representations of nilpotent groups. *Trans. Amer. Math. Soc.* 185 (1973), 445-462.
- [58] MOSCOVICI, H. A vanishing theorem for  $L^2$ -cohomology in the nilpotent case. *Non-commutative harmonic analysis*, Springer-Verlag Lecture Notes in Math. 728 (1979), 201-210, Berlin, Heidelberg, New York.
- [59] MOSCOVICI, H. and A. VERONA. Harmonically induced representations of nilpotent Lie groups. *Inventiones Math.* 48 (1978), 61-73.
- [60] NARASIMHAN, M. and K. OKAMOTO. An analogue of the Borel-Weil-Bott theorem for hermitian symmetric pairs of non-compact type. *Annals of Math. (3)* 91 (1970), 486-511.
- [61] OKAMOTO, K. On induced representations. *Osaka J. of Math.* 4 (1967), 85-94.
- [62] ——— On square-integrable  $\bar{\partial}$ -cohomology spaces attached to homogeneous symplectic manifolds. Unpublished manuscript, Institute for Advanced Study, Princeton, N.J.
- [63] OKAMOTO, K. and H. OZEKI. On square-integrable  $\bar{\partial}$ -cohomology spaces attached to hermitian symmetric spaces. *Osaka J. of Math.* 4 (1967), 95-110.
- [64] PARTHASARATHY, R. A note on the vanishing of certain  $L_2$ -cohomologies. *J. of Math. Soc. Japan* 23 (1971), 676-691.
- [65] ——— Dirac operator and the discrete series. *Annals of Math.* 96 (1972), 1-30.
- [66] ——— An algebraic construction of a class of representations of a semisimple Lie algebra. *Math. Ann.* 226 (1977), 1-52.

- [67] PENNEY, R. Canonical objects in the Kirillov theory of nilpotent Lie groups. *Proc. Amer. Math. Soc.* 66 (1977), 175-178.
- [68] — Harmonically induced representations of nilpotent Lie groups and automorphic forms on nilmanifolds. *Trans. Amer. Math. Soc.* 260 (1980), 123-145.
- [69] — Lie cohomology of representations of nilpotent Lie groups and holomorphically induced representations. *Preprint*, 1979.
- [70] PETER, F. und H. WEYL. Die vollständigkeit der primitiven darstellungen einer geschlossenen kontinuierlichen gruppe. *Math. Ann.* 97 (1927), 727-755.
- [71] *Proceedings of Symposia in Pure Math., Harmonic analysis on homogeneous spaces*, vol. 26 (1973), A.M.S., Providence, R.I.
- [72] PUKANSZKY, L. *Leçons sur les représentations des groupes*. Monographies de la Société Mathématique de France, Dunod, éditeur (1967), Paris.
- [73] RAMANAN, S. Holomorphic vector bundles on homogeneous spaces. *Topology* 5 (1966), 159-177.
- [74] ROSENBERG, J. Realization of square-integrable representations of unimodular Lie groups on  $L^2$ -cohomology spaces. *Trans. Amer. Math. Soc.* 261 (1980), 1-32.
- [75] SATAKE, I. Unitary representations of a semi-direct product of Lie groups on  $\bar{d}$ -cohomology spaces. *Math. Ann.* 190 (1971), 177-202.
- [76] SCHIFFMAN, G. Un analogue du théorème de Borel-Weil-Bott dans le cas non compact. *Séminaire Bourbaki*, June 1971, 323-336.
- [77] SCHMID, W. *Homogeneous complex manifolds and representations of semisimple Lie groups*. Ph.D. thesis, Univ. Calif., Berkeley, 1967.
- [78] — On a conjecture on Langlands. *Annals of Math.* 93 (1971), 1-42.
- [79] — Some properties of square-integrable representations of semisimple Lie groups. *Annals of Math.* 102 (1975), 535-564.
- [80] — On the characters of the discrete series. *Inventiones* 30 (1975), 47-144.
- [81] — Representations of semisimple Lie groups. *Lecture No. 8 from Proceedings of the SRC/LMS Research Symposium on Representations of Lie Groups, London Math. Soc. Series 34*, Cambridge Univ. Press, 185-235.
- [82] —  $L^2$ -cohomology and the discrete series. *Annals of Math.* 103 (1976), 375-394.
- [83] — A geometric construction of the discrete series for semisimple Lie groups. *Lectures from the Nato Advanced Study Institute on Harmonic Analysis and Representations of Semisimple Lie Groups held at Liege, Belgium, Sept. 1977*, edited by M. Cahen, M. DeWilde, and J. Wolf; D. Reidel Publ. Company.
- [84] SINGER, I. Some remarks on operator theory and index theory, from  $K$ -theory and Operator Algebras. *Springer-Verlag Lecture Notes in Math.* 575 (1975), 128-138, Berlin, Heidelberg, New York.
- [85] VARADARAJAN, V. *Harmonic analysis on real reductive groups*. Springer-Verlag Lecture Notes in Math. 576 (1977), Berlin, Heidelberg, New York.
- [86] WAKIMOTO, M. Polarizations of certain homogeneous spaces and most continuous principal series. *Hiroshima Math. J.* 2 (1972), 483-533.
- [87] WALLACH, N. Induced representations of Lie algebras and a theorem of Borel-Weil. *Trans. Amer. Math. Soc.* 136 (1969), 181-187.
- [88] — *Harmonic analysis on homogeneous spaces*. Marcel Dekker, Inc., New York, 1973.
- [89] — Representations of semisimple Lie groups and Lie algebras. *Proceedings of the 1977 Seminar of the Canadian Math. Congress on Lie Theories and Their Applications, Queen's Papers in Pure and Applied Math. No. 48*, 154-246.
- [90] WANG, H. Closed manifolds with homogeneous complex structure. *Amer. J. of Math.* 76 (1954), 1-32.

- [91] WARNER, G. *Harmonic analysis on semisimple Lie groups, I, II*. 1972, Springer-Verlag, Vol. 188, 189, Berlin, Heidelberg, New York.
- [92] WELLS, R., Jr. *Differential analysis on complex manifolds*. Prentice-Hall, Englewood Cliffs, N.J., 1973.
- [93] WEYL, H. Theorie der darstellung kontinuierlichen halb-einfacher gruppen durch lineare transformationen. Teil I, *Mathematische Zeitschrift* 23 (1925), 271-309, Teil II, 24 (1926), 328-376, and Teil III, 24 (1926), 377-395.
- [94] ——— *The classical groups*. Princeton Univ. Press, Princeton, N.J., 1946.
- [95] WILLIAMS, F. Complex homogeneous bundles and finite-dimensional representation theory. *Proceedings of Symposia in Pure Math., Several complex variables, Vol. 30, Part 2* (1977), 317-320.
- [96] WOLF, J. The action of a real semisimple group on a complex flag manifold, I: Orbit structure and holomorphic arc components. *Bull. Amer. Math. Soc.* 75 (1969), 1121-1237.
- [97] ——— Complex manifolds and unitary representations. *Proceedings of the International Conference in Several Complex Variables*, Univ. Maryland, 1970, Springer-Verlag Lecture Notes in Math. 185 (1971), 242-287, Berlin, Heidelberg.
- [98] ——— Orbit method and nondegenerate series. *Hiroshima Math. J.* 4 (1974), 619-628.
- [99] ——— The action of a real semisimple group on a complex flag manifold, II: Unitary representations on partially holomorphic cohomology spaces. *Memoirs Amer. Math. Soc.*, No. 138, 1974.
- [100] ZELENENKO, D. *Compact Lie groups and their representations*. « Nauka », Moscow, 1970; English transl. Transl. Math. Monographs, Vol. 40, Amer. Math. Soc., Providence, R.I., 1973.

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