

# CONTENTS

<b>0. Introduction</b> .....	1
<b>1. Connections and Laplacians associated to a principal bundle</b> .....	15
1.1. Connections associated to a principal bundle .....	15
1.2. Curvatures and Laplacians associated to a principal bundle .....	17
<b>2. <math>G</math>-invariant Bergman kernels</b> .....	21
2.1. Casimir operator .....	22
2.2. $\text{Spin}^c$ Dirac operator .....	23
2.3. $G$ -invariant Bergman kernel .....	25
2.4. Localization of the problem and proof of Theorem 0.1 .....	27
2.5. Induced operator on $U/G$ .....	32
2.6. Rescaling and a Taylor expansion of the operator $\Phi\mathcal{L}_p\Phi^{-1}$ .....	33
2.7. Uniform estimate on the $G$ -invariant Bergman kernel .....	41
2.8. Evaluation of $J_{r,u}$ .....	53
2.9. Proof of Theorem 0.2 .....	54
<b>3. Evaluation of <math>P^{(r)}</math></b> .....	57
3.1. Spectrum of $\mathcal{L}_2^0$ .....	57
3.2. Evaluation of $P^{(r)}$ : a proof of (0.12) and (0.13) .....	60
3.3. A formula for $\mathcal{O}_1$ .....	62
3.4. Example $(\mathbb{C}P^1, 2\omega_{FS})$ .....	67
<b>4. Applications</b> .....	71
4.1. Orbifold case .....	71
4.2. $\vartheta$ -weight Bergman kernel on $X$ .....	74
4.3. Averaging the Bergman kernel: a direct proof of (0.15) and (0.16) .....	76
4.4. Berezin-Toeplitz quantization .....	79
4.5. Toeplitz operators on $X_G$ .....	85
4.6. Generalization to non-compact manifolds .....	90

4.7. Relation on the Bergman kernel on $X_G$ .....	92
<b>5. Computing the coefficient <math>\Phi_1</math></b> .....	95
5.1. The second fundamental form of $P$ .....	96
5.2. The operators $\mathcal{O}_1, \mathcal{O}_2$ in (2.102) .....	98
5.3. Computation of the coefficient $\Phi_1$ .....	112
5.4. Final computations: the proof of Theorem 0.6 .....	122
5.5. Coefficient $\Phi_1$ : general case .....	124
<b>6. The coefficient <math>P^{(2)}(0, 0)</math></b> .....	127
6.1. The terms $\Psi_{1,1}, \Psi_{1,3}, \Psi_{1,4}$ .....	127
6.2. The term $\Psi_{1,2}$ .....	132
6.3. Proof of Theorem 0.7 .....	145
<b>7. Bergman kernel and geometric quantization</b> .....	147
<b>Bibliography</b> .....	149
<b>Index</b> .....	153