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UNITARY NILPOTENT GROUPS AND HERMITIAN K-THEORY. I

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This announcement computes the Wall surgery obstruction groups of amalgamated free products of finitely presented groups by using the new UNil functors introduced below. Special cases of these results **[C4]** were obtained as consequences of the splitting theorems of **[C3]**. The present results use the general results on manifold decomposition outlined in **[C7]**. Further applications to the study of manifolds and submanifolds, Poincaré duality spaces, diffeomorphism groups, and Novikov's conjecture **[C8]** will be presented elsewhere.

1. UNil **of bimodules with involution.** Let R be a ring with unit and involution. Let M be an R-bimodule with involution; i.e. M is equipped with a homomorphism $x \to \bar{x}$ satisfying $\bar{\bar{x}}=x$, $(\alpha x \beta)^{-}=\bar{\beta}\bar{x}\bar{\alpha}$, $x \in M$, $\alpha, \beta \in R$. Call M hyperbolic if there is a decomposition of R-bimodules $M=N \oplus \bar{N}$, $\bar{N}=\{\bar{x} | x \in N \subset M\}$.

By a $(-1)^k$ Hermitian form over M we mean a triple (P, λ, μ) where P is a finitely generated free right R-module and $\lambda: P \times P \to M$, $\mu: P \to M/\{x-(-1)^k\bar{x} | x \in M\}$ satisfy:

(i) for $x \in P$ fixed, $y \to \lambda(x, y)$ is an R-homomorphism $P \to M$;
(ii) $\lambda(x, y)=(-1)^k(\lambda(y, x))^{-}$, $x, y \in P$;
(iii) $\lambda(x, x)=\mu(x)+(-1)^k(\mu(x))^{-}$ in M, $x \in P$;
(iv) $\mu(x+y)=\mu(x)+\mu(y)+\lambda(x, y)$, $x, y \in P$;
(v) $\mu(x\alpha)=\bar{\alpha}\mu(x)\alpha$, $x \in P$, $\alpha \in P$.

Let M_1 and M_2 be R-bimodules with involution which are free left R-modules. A (resp; simple) $(-1)^k$ UNil form over (M_1, M_2) is $C=(P_1, \lambda_1, \mu_1; P_2, \lambda_2, \mu_2)$ with $P_2=P_1^*$ and (P_i, λ_i, μ_i) a $(-1)^k$ Hermitian form over M_i, $i=1, 2$, for which there exist finite filtrations of R-modules

$$P_1 = P_1^0 \supset P_1^1 \supset P_1^2 \supset \cdots \supset P_1^n = 0,$$
$$P_2 = P_2^0 \supset P_2^1 \supset P_2^2 \supset \cdots \supset P_2^m = 0$$

so that, letting $\rho_1=P_1 \to P_2 \otimes_R M_1$ denote the adjoint of λ_1 and $\rho_2: P_2 \to P_1 \otimes_R M_2$ denote the adjoint of λ_2,

$$\rho_1(P_1^i) \subset P_2^{i+1} \otimes_R M_1, \qquad \rho_2(P_2^i) \subset P_1^{i+1} \otimes_R M_2, \qquad i \geqq 0$$

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