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## THE WITT GROUP OF LAURENT POLYNOMIALS

by Manuel OJANGUREN and Ivan PANIN

ABSTRACT. We give a direct, self-contained proof of the fact that for a large class of rings  $A$ , in particular for all regular rings with involution,  $W(A[t, 1/t]) = W(A) \oplus W(A)$ .

### 1. INTRODUCTION

The purpose of this note is to give a short direct proof of two fundamental theorems on the Witt group of polynomials and Laurent extensions of a ring  $A$ . These theorems were proved independently by M. Karoubi [3] and by A. Ranicki [5]. We will state them under the most general conditions on  $A$  and for their proofs we will use nothing more than a general result on the  $K$ -theory of Laurent polynomials. In the last section we will show, by two counterexamples, that the assumptions we make on  $A$  are necessary.

We begin by recalling briefly some definitions. We refer to [4] for a more detailed exposition and for the proofs of the few basic results that we will use.

Let  $A$  be an associative ring with an involution denoted by  $a \mapsto a^\circ$ . Except in §2 we will always assume that 2 is invertible in  $A$ . If  $M$  is a right  $A$ -module, we denote by  $M^*$  its dual  $\text{Hom}_A(M, A)$  endowed with the right action of  $A$  given by  $fa(x) = a^\circ f(x)$  for any  $f: M \rightarrow A$  and  $a \in A$ . If  $P$  is a finitely generated projective right  $A$ -module we identify it with  $P^{**}$  through the canonical isomorphism mapping  $x \in P$  to  $\hat{x}: P^* \rightarrow A$  defined by  $\hat{x}(f) = f(x)$ .

Let  $\epsilon$  be 1 or  $-1$ . An  $\epsilon$ -hermitian space over  $A$  is a pair  $(P, \alpha)$  consisting of a finitely generated projective right  $A$ -module  $P$  and an  $A$ -isomorphism  $\alpha: P \rightarrow P^*$  satisfying  $\alpha = \epsilon\alpha^*$ . For brevity  $\epsilon$ -hermitian spaces will be called *spaces*. A 1-hermitian space (over a commutative ring  $A$ ) is also called a *quadratic space*.