1114-11-20 **Cindy Tsang*** (cindytsy@math.ucsb.edu). *On the Galois Module Structure of the Square Root of the Inverse Different in Abelian Extensions.* Preliminary report.

Let K be a number field with ring of integers $\mathcal{O}_K$ and let G be a finite group of odd order. Given a finite Galois extension L/K with $\mathrm{Gal}(L/K) \simeq G$, Hilbert's formula implies that there exists a fractional ideal $A_{L/K}$ in L whose square is the inverse of the different ideal of L/K. A theorem of Erez states that $A_{L/K}$ is locally free over $\mathcal{O}_K G$ if and only if L/K is weakly ramified, in which case it defines a class $[A_{L/K}]$ in the locally free class group $\mathrm{Cl}(\mathcal{O}_K G)$ of $\mathcal{O}_K G$. In this paper, we show that

$$\mathcal{A}^t(\mathcal{O}_K G) := \{[A_{L/K}] : L/K \text{ is a tame Galois extension with } \mathrm{Gal}(L/K) \simeq G\}$$

is a subgroup of $\mathrm{Cl}(\mathcal{O}_K G)$ when G is abelian. Moreover, we will study the difference between $\mathcal{A}^t(\mathcal{O}_K G)$ and the set

$$\mathcal{A}(\mathcal{O}_K G) := \{[A_{L/K}] : L/K \text{ is a weakly ramified Galois extension with } \mathrm{Gal}(L/K) \simeq G\}$$

of all such classes. (Received May 19, 2015)