Meeting: 1001, Evanston, Illinois, SS 18A, Special Session on Applications of Motives

1001-11-20 **David A. Terhune*** (terhune@math.psu.edu), 218 McAllister Bldg., University Park, PA 16802.
Explicit Evaluations of a Class of Double L-values.

We define the 'convolution'-type double L-value

$$L\begin{pmatrix}\chi,\psi\\ a,b\end{pmatrix}=\sum_{m,n=1}^{\infty}\frac{\chi(m)\psi(n)}{m^a(m+n)^b}, \qquad (1)$$

for Dirichlet characters χ,ψ, and $a,b\in\mathbb{Z}_+$, when this sum converges. An analytic proof of the following theorem will be given.

Theorem 1. Let χ,ψ be non-principal Dirichlet characters with respective conductors D,E, $a,b\in\mathbb{Z}_+$. Set $F=lcm\{D,E\}$, $m=lcm\{D,E,\varphi(D)\varphi(E)\}$, and $K=\mathbb{Q}(i,e(1/m))$, where $e(x)=e^{2\pi ix}$, and φ denotes the Euler Phi function. If

$$\chi\psi(-1)=(-1)^{a+b-1},$$

then (1) *equals a K-linear finite combination of products of positive integer values of L-series of Dirichlet characters with conductors dividing F.*

The proof produces some interesting formulas for the promised evaluations, of which examples will be given. (Received June 25, 2004)