Abstract. Let X and Y be two closed connected Riemannian manifolds of the same dimension and $\phi : S^*X \mapsto S^*Y$ a contact diffeomorphism. We show that the index of an elliptic Fourier operator Φ associated with ϕ is given by $\int_{B^*(X)} \mathrm{e}^{\theta_0} \hat{A}(T^*X) - \int_{B^*(Y)} \mathrm{e}^{\theta_0} \hat{A}(T^*Y)$ where θ_0 is a certain characteristic class depending on the principal symbol of Φ and, $B^*(X)$ and $B^*(Y)$ are the unit ball bundles of the manifolds X and Y. The proof uses the algebraic index theorem of Nest-Tsygan for symplectic Lie Algebroids and an idea of Paul Bressler to express the index of Φ as a trace of 1 in an appropriate deformed algebra.

In the special case when $X = Y$ we obtain a different proof of a theorem of Epstein-Melrose conjectured by Atiyah and Weinstein.