Local Versions of the Wiener-Levi Theorem

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Let $h(z)$ be an analytic (or real-analytic) function in the neighborhood of some compact set K on the plane $\mathbb{C}$. We show that for any complex measure μ on the Euclidean space $\mathbb{R}^d$ of a finite total variation without singular components there is another measure ν without singular components such that its Fourier transform $\hat{\nu}(y)$ coincides with $h(\hat{\mu}(y))$ for each $y \in \mathbb{R}^d$, for which $\hat{\mu}(y) \in K$. If K contains the set $\hat{\mu}(\mathbb{R}^d)$ and μ is a pure point or an absolute continuous measure, we get the known versions of the Wiener-Levi theorem [1]. Also, some applications to the theory of quasicrystals are given ([2], [3]).

References

[1] W.Rudin. *Functional Analysis*. New York : McGraw -Hill Book Company, 1973.
[2] S.Favorov. Large Fourier quasicryals and Wiener's Theorem. *Journal of Fourier Analysis and Applications*, 25(2) : 377–392, 2019.
[3] S.Favorov. Local Wiener's Theorem and Coherent Sets of Frequencies. *Analysis Mathematica*, to appear in 2020.