The optical detection of the pulsar wind nebula in the young galactic SNR G292.0+1.8

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G292.0+1.8 is the Cas A-like SNR containing the young pulsar J1124-5916, which powers a compact torus-like pulsar wind nebula with a jet visible in X-rays. We have performed deep optical observations of the pulsar field in an attempt to detect the optical counterpart of the pulsar and its wind nebula. The observations were carried out using the direct imaging mode of FORS2 at the ESO VLT/UT1 telescope in the V, R, and I bands. Employing the Chandra/ACIS archival data, we revised the position of the PSR J1124–5916 X-ray counterpart using a dozen of USNO stars visible in the Chandra FOV. In all three optical bands we detect a faint extended elliptical object, whose peak brightness and center position are consistent at a sub-arcsecond level with the X-ray position of the pulsar. The morphology of the object and the orientation of its major axis are in a good agreement with the central part of the torus region of the pulsar wind nebula seen almost edge on in X-rays. We do not resolve any point-like object within the nebula that could be identified with the pulsar; we estimate that its contribution to the observed optical flux is less than 10%. Extracting the X-ray spectrum from the physical region equivalent to the optical source size, we combine the multiwavelenth spectrum of the central part of the nebula. Within uncertainties of the interstellar extinction towards G292.0+1.8 it reminds the spectrum of the Crab pulsar wind nebula. The position, morphology and spectral properties of the detected object strongly suggests that we have detected the optical counterpart of the pulsar plus its wind nebula in G292.0+1.8.