Let \((X_i)_{i \geq 1}\) be a stationary ergodic process with marginal distribution function \(F(t) = P(X_1 \leq t)\). We define the empirical distribution function \(F_n(t)\) and the empirical process \(U_n(t)\) by

\[
F_n(t) = \frac{1}{n} \# \{ 1 \leq i \leq n : X_i \leq t \}
\]

\[
U_n(t) = \sqrt{n}(F_n(t) - F(t)), \quad t \in \mathbb{R}.
\]

In the case of i.i.d. data \((X_i)_{i \geq 1}\), Donsker (1952) showed the empirical process central limit theorem, i.e. convergence of the empirical processes towards a Gaussian process \((W(t))_{t \in \mathbb{R}}\) with mean zero and covariance kernel

\[
\text{Cov}(W(s), W(t)) = \min(F(s), F(t)) - F(s) F(t).
\]

Various authors, starting with Billingsley (1968) have generalized the empirical process CLT to the case of dependent data, especially to mixing processes. In our talk we present a new technique for proving empirical process CLTs for dependent data that is especially useful for Markov chains and dynamical systems for which the CLT can be established via spectral methods. We will also present generalizations to \(\mathbb{R}^d\)-valued data. As an example, we prove the empirical process CLT for ergodic torus automorphisms. (Joint work with Olivier Durieu (Tours) and Dalibor Volný (Rouen)).