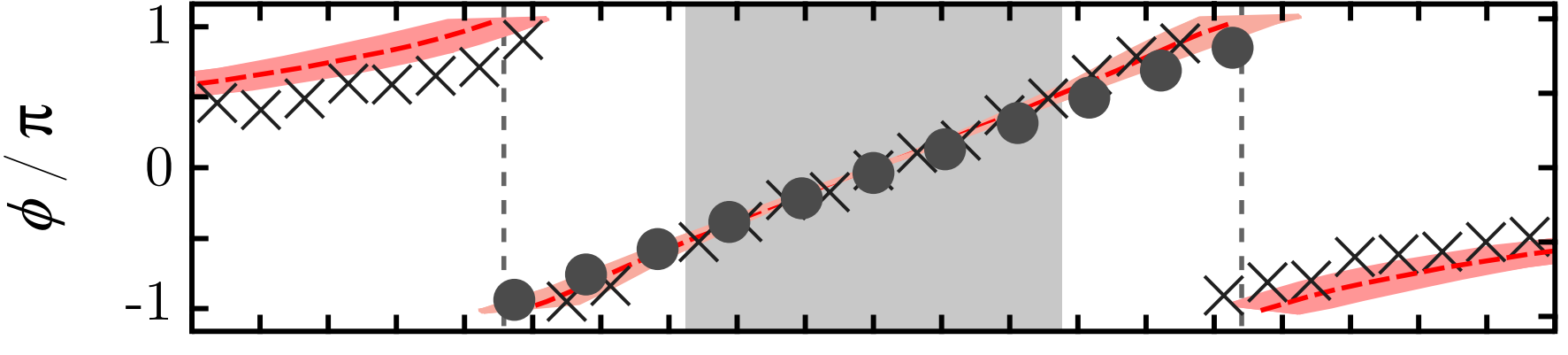(a) Peierls tunneling phase